DRAFT COSTED SHEDULE OF WORK

provn of Work : 04 x ADL

Ser No	Description of work	Auth	Drg	Brief Description	A/U	Qty	Remarks
1	As above	As above	Att	1. Scope of Work :- Supply of Material for 04 x ADL (Autonomus Defended Locality). Each ADL consisting of 04 x Autonomous PDs and 01 x Auonoumous CP both of RCC with 155 mm OHP, of shape and size as described in the technical sanction attached alongwith Fd Elect Hybrid Solar (5KW). Detailed Specification shall be as per Technical Specification.	Nos	4.00	

PROVN of Work : 04 X ADL

Ser No	Brief Description	A/U	QTY	REMARKS
1	1. **Scope of work**. **Provn of 04 X ADL**. The wk consists of supply of items for **04 x ADL (Automated Defence Locality)**. Each ADL will consist of the following field Defence structures:- . (a) PD :- RCC PD (155 mm OHP) of Trapezium shape of size 2.38M x 2.00M (Inner to Inner)- **4 Nos.** (b) CP :- RCC Comd Post (155 mm OHP) of semicircular shape of size 3600 mm x 3800 mm (Inner to Inner) -**01 Nos.** (c) Fd Elect Hybrid Solar 5KW - **01 Nos.** Detailed Specification of PDs, CP and Fd Elect Hybrid Solar 5KW shall be as per subsequent paras.	**Nos**	**4**	
	2. PD (04 Nos) :-			
	2.1 . **Scope of work**. **Provn of RCC Based PD**. Supply only of RCC Based PD of Trapezium shape of size 2.38 M x 2.00 M (Inner to Inner) made up of 300 mm thick RCC walls, along with Over Head Protection (OHP) made up of continuous RCC slabs, earth and RR stones filling. The structure will be constr 1100 mm deep below GL and 1200 mm above the ground. The construction will be carried out as per the drawings att. Constructin Material and store for 01 x PD is as per Job Card attached as **Appx 'A'.**	**Nos**	**16**	
	2.2. Earth Work Excavation.			
	(a) Excavation work over an area of 3880mm x 3500mm and 1450 mm depth including raft fdn for building			
	(b) Addl excavationi for column length 600mm, width 600mm and depth 550mm as per drawing att.			
	(c) The excavated earth shall be used for OHP.			
	2.3. Dimension. The PD will be Trapezium in shape with size of 2380mm x 2000 mm (inner to inner). The PD will have a clear height of 2300 mm with 1100 mm below ground level and 1200 mm height above ground level.			
	2.4. Foundation Detail. (a) **RCC Foundation**. (i) Raft foundation will be provided over Plain Cement Concrete (PCC) 1:4:8, 100mm thick using graded stone aggregate 40 mm of size as shown in drawing. (ii) The Raft reinforcement will consist of 12mm dia bars at 150 c/c both ways on top face of raft slab with clear cover of 50mm and 12 mm dia bars at 150 c/c both ways on bottom face of raft slab with clear cover of 50mm. The thickness of foundation will be 350 mm (iii) The RCC in raft foundation will be provided ratio 1:1.5:3 Grade using 20 mm aggregate as per drawing att.			

Ser No	Brief Description	A/U	QTY	REMARKS
	2. 5. RCC Column : 4 x RCC Columns will be provided with RCC in ratio 1:1.5:3 of size 300 x 300 mm will be erected reinforced with 06 Nos 16mm dia bars with 8mm stirrups at 150 mm c/c with top finished with levelling course as per drawing No 4 att. The column footing shall be with PCC 1:4:8 sub base of 100mm thickness all as per drawing			
	2.6. RCC Wall. RCC wall of thickness 300 mm shall be provided with RCC in ratio 1:1.5:3. Reinforcement will be provided as per drawing att and reinforced with 10 mm dia bars on both ways. PBS roll 3 mm thick will be fixed all around the external surface of wall from bottom to top and HDPE sheet will be fixed over PBS roll to arrest the seepage. Internal and External wall will be plastered in CM 1:4, 15mm thick			
	2.7. Flooring. 50 mm thick PCC (1:2:4) using 20 mm graded aggregate finished even and smooth laid finished floor level.			

Ser No	Brief Description	A/U	QTY	REMARKS
	2. 8. Door. **(a)** Steel door of size 900 x 1800mm shall be provided as per drawing. Main frame work shall be of MS angle 50 x 50 x 6mm. MS Sheet 2 mm thick shall be provided as cladding of the door with flat iron 25 x 4 mm bracings including locking arrangements & handles on both sides of the shutters. The door shall be openable inwards. The door frame will have 06 Nos hold fast 200 mm long made of 50 x 6 mm flat iron. Job No will be engraved on the inner side. All fabricatioin shall as per drg att. **2.9. Loop Hole**. **(a)** Loop hole of size 2130 x 1067 mm at outer face) of wall surface will be provided inbuilt within the RCC wall. Loop holes with a trapezodial frame shall be make of angle iron 50x50x6mm and flat iron 40x6 mm covered with 3 mm thick mild steel sheet from inside on four sides excepts outer and inner opening with four Nos hold fast size 200x50x6mm flat iron two on either side with two ends mild steel door made of 8 mm thick mild steel plate 600x500mm with sliding slit of 75x75mm on one door. The door should be fixed with required Nos of heavy duty box hinges of 100 mm size with the dimension of outer opening of the loop hole box being 900 mm x 700mm. MS tower bolt two Nos 16 mm dia 200 mm long to be provided to shut the door. The Loop Hole door should be openable Outside with locking arrangement in the form of hook to prevent the door from closing back again whenever requried. **Horizontal Anti Drone Collapsible shutter, being operated manually / automatically to be considered at inner opening of the Loop Hole.** Edges of the loop holes to be chamfered evenly. Make : TATA, SAIL (Details as per drg attached). **2.10. Roof Beam**. A Roof beam of size 250 mm x 300 mm shall be provided with RCC in ratio 1:1.5:3. RCC wall consisting of 4 Nos of 10 mm TMT bars and stirrups of 8 mm TMT bars at a spacing of 150 mm c/c. **2.11. Roof :** The roof for PDs shall be made of following courses:- (a) **1stCourse**. 200 mm thick continuous RCC Slab shall be provided merging with the RCC roof beam. The slab will consist of horizontal and vertical TMT bars of 10 mm dia at a spacing of 150 mm c/c. (b) **2nd Course**. 3 mm thick PBS Roll will be placed over RCC slab (c) **3rd Course.** 50 mm thick PCC 1:2:4 laid over PBS Roll. (d) **4th Course**. After laying PCC 450 mm thick parapet wall of stone masonry on surrounding will be constructed to hold the loose soil and other roof filling materials (as shown in drawing att. The parapet will be covered with 50 mm thick 1:2:4 PCC copping at the top. (e) **5th Course.** After complete setting of parapet wall and PCC, 10 mm thick MS plate will be fixed to cover the entire area of roof. (f) **6th Course.** Thereafter 150 mm shredded rubber layer, comprising 50 mm crumb rubber tiles of suitable size/shape to cover the entire roof in three layers, will be fixed over complete roof. After laying of 150 mm shredded rubber layer over entire roof, filling of 400 mm soil and thereafter two Nos of 20mm thick MS plate will be placed separated by an air gap of 25 mm. The air gap will be maintained by placing 25 mm thick stone aggregate locally collected.			

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	(g) **7th Course.** A layer of loose soil of 200mm thickness shall be laid over MS plate. (h) **8th Course.** A buster layer of thickness 100mm thickness shall be provided with locally collected moorum over 200mm thick loose earth filling. (j) **9th Course.** A 100mm thick camouflage layer will be laid over the buster layer and approximately 10 to 15 degree slope will be maintained **2.12**. **Painting/Distemper**. All metallic parts will be painted with two coats of synthetic enamel paint of approved colour over a coat of red oxide. Internal surfaces Two coats of synthectic enamel paitn over a coat of primer and external surfaces two coat of Apex paint of camouflage pattern colour over a coat of primer shall be applied on concrete surfaces as per direction of OC, 426 (I) Fd Coy. Make: Asian Paints/ Berger/ Nerolac/ Shalimar. **2.13. PBS Roll.** PBS roll and HDPE sheet 400 micron for underground seepage protection in roof and external surface of wall **2.14. The Lightening Conductor.** Lightening Conductor made of copper Tube 150 cm long x 25mm dia with five copper prongs of length 15cm each fixed to copper ball of dia 50mm and 4mm thick with securing arrangement. Bottom 40cm portion of the copper tube will be covered with PVC insulating material to avoid direct contact between the building and the lightening conductor. GI plate of 60cm x60cm x 3mm will be provided for earthing purpose and will be placed 2.5m below.GL. GI Plate and copper conductor will be connected by using 4mm dia GI conductor wire .GI conductor wire will pass through PVC conduct pipe to avoid direct contact between building and GI wire. Necessary insulated MS clamps for fitting PVC conduit pipe with building will be provided. For effective earthing of the struck lighting moisture near GI plate needs to be maintained moisture will be maintain by covering GI plate with 15cm alternative layers of salt and charcoal as per details given in the drawing att. Two GI funnel fixed with20mm dia GI pipe of length 1.5m will be provided for passing GI conductor wire and supplying water at 2.5m depth. Man hole will be covered by using PVC cover of size 65cm x65cm over PCC pit. 15cm long Termination point aluminium strip of size 25mm x3mm having holes at both ends for fixing GI conductor wire coming from copper tube and GI plate with suitable nuts and bolts, will be provided at plinth level to check the resistance of the earthing. **Note** Lightening arrester shall be conform with IS -2309:1989.			

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	2.15. Wall Peg Hook : Stainless Steel premium fesue dual dege 8 pin cloth hanger shall be provided			
	2.16. MS Pipe : MS round pipe of 20 mm dia for telephone outlet and MS round pipe of 150mm dia for ventilation/bukhari outlet shall be provided.			
	2.17. PPGI Sheet : PPGI sheet 0.60 mm thick shall be provided in front of door entrance and RR masonry wall will be constructed of size Length 900mm, width 400mm and height up roof level of PD.			
	2 .18 Electric Items . All electric items shall be ISI marked. List att as per **Apxx 'B'**			
	3. RCC Based CP (01 No)		**4**	
	3.1. Scope of Work Provn of RCC Based CP Construction of Comd Post (155 mm) of semicircular shape of size 3600 mm x 3800 mm (Inner to Inner) made up of 300 mm thick RCC walls, along with Over Head Protection (OHP) made up of continuous RCC slabs, shredded rubber MS plates, earth filling. The structure will be constructed 1600 mm below GL and 700 mm above the ground as per drawing att. Constructin Material and store for 01 x PD is as per Job Card attached as **Appx 'C'.**			
	3. 2. Earth Work Excavation.Excavation work will be carried over an area of 5100mm x 5100 mm with 1600 mm depth. An additional excavation of 450 mm x 450 mm x 500 mm shall be carried out for column footing. The excavated earth shall be used for OHP.			
	3.3. Dimensions.The RCC Comd Post will be semicircular in shape and will be of size 3600 mm x 3800 mm (Inner to Inner). The RCC Comd Post will have a clear height of 2300 mm with 1600 mm below GL and 700 mm height above ground level.			
	3.4. Foundation Detail. **(a) RCC Foundation .** (i) Raft foundation will be provided over Plain Cement Concrete (PCC) 1:4:8, 100 mm thick using graded stone aggregate of size 20 mm. (ii) The Raft reinforcement will consist of 12mm dia bars at 150 c/c both ways on top face of raft slab with clear cover of 50mm and 12 mm dia bars at 150 c/c both ways on bottom face of raft slab with clear cover of 50mm. The thickness of foundation will be 350 mm. (iii) The RCC in raft foundation will be 1:1.5:3 Grade using 20 mm aggregate as per drawing. **(b) RCC Column.** (i) 6 x RCC Columns of size 300 x 300 mm will be erected reinforced with 08 Nos 16mm dia bars with 8mm stirrups at 150 mm c/c with top finished with levelling course as per drawing attached no 3 att. The column footing shall be with PCC 1:4:8 sub base of 100mm thickness all as per drawing no 5. **(c) RCC Wall.** RCC wall of thickness 300 mm shall be provided with RCC in ratio 1:1.5:3. Reinforcement will be provided as per drawing. PBS roll 3 mm thick will be fixed all around the external surface of wall from bottom to top and HDPE sheet will be fixed over PBS roll to arrest the seepage.			

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	3.5. **Flooring.** 50 mm thick PCC (1:2:4) using 20 mm graded aggregate finished even and smooth laid finished floor level.			
	3.6. **Door**. One Steel door of size 900 mm x 1800mm shall be provided. Main frame work shall be of MS angle 50 mm x 50 mm x 6mm. MS Sheet 2 mm thick shall be provided as cladding of the door with flat iron 25 x 4 mm bracings including locking arrangements & handles on both sides of the shutters. The door shall be open-able inwards. The door frame will have 06 Nos hold fast 200 mm long made of 50 mm x 6 mm flat iron. Job No will be engraved on the inner side. All fabrication shall as per drawing.			
	3.7. **Loop Hole.** Three Nos of loop hole of size (600 mm x 500 mm at inner face) and (900 x 700 mm at outer face) of wall surface will be provided inbuilt within the RCC wall. The door should be fixed with required Nos of heavy duty box hinges of 100 mm size with the dimension of outer opening of the loop hole box being 900 mm x 700mm. MS tower bolt two Nos 16 mm dia 200 mm long to be provided to shut the door. The Loop Hole door should be openable Outside with locking arrangement in the form of hook to prevent the door from closing back again whenever requried. **Horizontal Anti Drone Collapsible shutter, being operated manually / automatically to be considered at inner opening of the Loop Hole.** Edges of the loop holes to be chamfered evenly. Make : TATA, SAIL (Details as per drg attached). Edges of the loop holes to be chamfered evenly. Make : TATA, SAIL (Details as per drg attached).The frame will be pre painted with two coats of red oxide primer. Loopholes shall be painted as per of colours and pattern as directed by OC 426 (I) Fd coy. Fabrication of loopholes shall be done as per Drawing.			
	3.8. **Roof Beam.** A Roof beam of size 250 mm x 300 mm shall be provided over the completed RCC wall consisting of 4 nos of 10 mm TMT bars and stirrups of 8 mm TMT bars at a spacing of 150 mm c/c.			

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	3.9. Roof. The roof shall be made of following courses : **(a) 1stCourse.**200 mm thick continuous RCC Slab shall be provided merging with the RCC roof beam. The slab will consist of horizontal and vertical TMT bars of 10 mm dia at a spacing of 150 mm c/c. **(b) 2nd Course.**3 mm thick PBS Roll will be placed over RCC slab. **(c) 3rd Course.**50 mm thick PCC 1:2:4 laid over PBS Roll. **(d) 4th Course**.After laying PCC 450 mm thick parapet wall of stone masonry on surrounding will be constructed to hold the loose soil and other roof filling materials (as shown in drawing att. The parapet will be covered with 50 mm thick 1:2:4 PCC copping at the top. **(e) 5th Course**.After complete setting of parapet wall and PCC, 10 mm thick MS plate will be fixed to cover the entire area of roof. **(d) 6th Course**.Thereafter 150 mm shredded rubber layer, comprising 50 mm crumb rubber tiles of suitable size/shape to cover the entire roof in three layers, will be fixed over complete roof. After laying of 150 mm shredded rubber layer over entire roof, filling of 400 mm soil and thereafter two Nos of 20mm thick MS plate will be placed separated by an air gap of 25 mm. The air gap will be maintained by placing 25 mm thick stone aggregate locally collected. **(e) 7th Course**.A layer of loose soil of 200mm thickness shall be laid over MS plate. **(f) 8th Course**.A buster layer of thickness 100mm thickness shall be provided with locally collected moorum over 200mm thick loose earth filling. **(g) 9th Course.**A 100mm thick camouflage layer will be laid over the buster layer and approximately 10 to 15 degree slope will be maintained.			
	3.10. Painting/Distemper. All metallic parts will be painted with two coats of synthetic enamel paint of approved colour over two coats of red oxide. External surfaces above ground level shall be painted in camouflage pattern colour as per directions of OC, 426 (I) Fd Coy.			
	3.11. The Lightening Conductor. Lightening Conductor made of copper Tube 150 cm long x 25mm dia with five copper prongs of length 15cm each fixed to copper ball of dia 50mm and 4mm thick with securing arrangement. Bottom 40cm portion of the copper tube will be covered with PVC insulating material to avoid direct contact between the building and the lightening conductor. GI plate of 60cm x60cm x 3mm will be provided for earthing purpose and will be placed 2.5m below.GL. GI Plate and copper conductor will be connected by using 4mm dia GI conductor wire .GI conductor wire will pass through PVC conduct pipe to avoid direct contact between building and GI wire. Necessary insulated MS clamps for fitting PVC conduit pipe with building will be provided. For effective earthing of the struck lighting moisture near GI plate needs to be maintained moisture will be maintain by covering GI plate with 15cm alternative layers of salt and charcoal as per details given in the drawing att. Two GI funnel fixed with20mm dia GI pipe of length 1.5m will be provided for passing GI conductor wire and supplying water at 2.5m depth. Man hole will be covered by using PVC cover of size 65cm x65cm over PCC pit. 15cm long Termination point aluminium strip of size 25mm x3mm having holes at both ends for fixing GI conductor wire coming from copper tube and GI plate with suitable nuts and bolts, will be provided at plinth level to check the resistance of the earthing. Note Lightening arrester shall be conform with IS -2309:1989.			
	3.12. Electric Items . All electric items shall be ISI marked. List att as per **Apxx 'D'.**			
	4. 01 x SOLAR HYBRID POWER PLANT (5KW)		**4**	

Ser No	Brief Description	A/U	QTY	REMARKS
	4.1. **Scope of work.** Supply and installation and testing of solar hybrid power plant of capacity 2 KW wind turbines and 3 KW Solar Modular along with all standard accessories including one year maintenance. The product should be able to with stand the temp range upto minus 50 degrees centigrade with insulated battery case and provide output at stand-alone location with minimum maintenance. As per design criteria and dimensions given below and including Construction material for construction of plinth for installation and store for 01 x Solar Hybrid Power Plant is as per Job Card attached as Appx **'E'.** **Components**. (i) Vertical simonies wind turbines 500 w @ 17 m /s - 4 Nos. (ii) Solar Module ≥ 390 Wp capacity - 8 Nos. (iii) Power conditioning Unit - ≥ 4KVA-48VDC-230VAC 50Hz-11 - 01 Nos. (iv) Battery Bank (PLT) - 48 V- 300 AH. (v) DC and AC distribution boxes - 1 set. (vi) AC and DC cables with a Max of 70 Mtrs laying. (vii) 2.5 Sqmm single core cable required length as per site (viii) Load details - 3KW(Solar) + 2KW (Wind) (ix) Type of Load - DC/AC (x) Backup hours reqd- 4 to 6 hrs (post optimum input duration) (xi) Load which can be run efficiently - constant 2 KW (Assuming optimum solar energy & wind avlb of 4 hrs) and Max 4KW (xii) Ratio of wind & solar components - 40:60 **[Note : Warranty of 5 years on PV System and 2 Years on Battery and Inverter].**			

Ser No	Brief Description	A/U	QTY	REMARKS
	4.2 Brief Specifications for Hybrid Solar Wind Power Pland (5KVA) **4.2.1 Solar Photovoltaic Modulae** **(a) Electrical Parameters.** (i) Peak Power Pmax (Wp) - ≥390 Wp, 72 cells. (ii) Mill Maximum Power output - 500W (Min) @ 17-18m/s. All these specs of 4 KVA or 5 KVA (iii) Open circuit Voltage (VOC) – 49.3V. (iv) Maximum Current (Impp) – 9.88A. (v) Short Circuit Current (Isc) – 10.14A. (vi) Module Efficiency - >19%. (b) **Mechanical Parameters.** (i) Cell technology – Poly/Mono Crystalline. (ii) Super-strate - High Transmission Low Iron Tempered Glass, AR coated (3.2mm). (iii) Back Sheet - Composite Film. (iv) Cell Encapsulation – EVA. (v) Junction Box - IP65/67, 3 bypass diodes. (vi) Material of the J Box closure – Plastic. (vii) Terminations – MC4 connectors (male & female) MC4 compatible.			
	(c) Material Specification:- (i) Peak power- Pmax (Wp) - ≥390 Wp, 72 Cells. (ii) RFID Tag - Inside the module with following details:- (aa) Name of the manufacturer of PV Module. PV Module used is reputed MNRE approved Poly-crystalline/Mono-crystalline. (ab) Name of the Manufacturer of Solar cells. Goldi/ Vikram Solar/ Renewsys/ Approved List of Models and Manufacturers by Ministry of New and Renewable Energy (MNRE). (ac) Month and year of the manufacture (separately for solar cells and module. (ad) Country of origin (separately for solar cells for module). (ae) I-V curve for the module. (af) Peak Wattage, Im, Vm and FF for the module. (ag) Date/year of IEC PV module qualification certificate. (ah) Name of the test lab issuing IEC certificate. (aj) Other relevant information on capability of solar cells and module as per ISO 9000 series.			
	(iii) IEC - IEC 61215, IEC 61730 & IEC 6170. (iv) Module Efficiency - Minimum 16%. (v) **Warranty** - PV Modules used in solar power plants/ systems must be warranted for their output peak watt capacity, which should not be less than 90% at the end of 10 years and 80% at the end of 20 years. One year on site replacement warranty against manufacturing defect breakage due to structural in efficiency over and above provisions given in specification. Free servicing every four months will be provided by the vendor on site. Running spares for One yr and training to the user will be part of the contract. (vi) Cell technology – Poly Mono Crystalline Silicon based. (vii) Super-strata (top layer) - High Transmission Low Iron Tempered Glass. (viii) Back Sheet UV resistant - Composite Film. (ix) Cell Encapsulation - EVA. (x) Junction box - IP65, 3 bypass diodes as required. (xi) Material of the JB enclosure– Plastic. (xii) Terminations - MC4 Connectors. (Male & Female)- MC4 Compatible.			

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	4.3 Power Conditioning Unit. (a) Max Input Capacity – Min. of 4KVA/Equivalent. (b) Charge Controller Type – MPPT. (c) Charging Stages - Float, Bulk, Boost (Adjustable). (d) AC Grid Input Supply Phase – As per site availability. (e) AC Voltage range - 230V (+/-10%V). (f) Nominal frequency - 50Hz(+/-3Hz). (g) Nominal battery Bank Voltage DC - 48VD. (h) Switching Element - MOSFET. (j) Nominal Output - 230V(+/-10%). (k) Output Waveform - Pure sine wave. (l) Nominal Frequency - 50 Hz. (m) Power Factor - 0.8 lag to 0.8 lead. (n) Output Capacity - ~KVA. (o) Over Load at nominal Voltage - 110% for 5 Seconds. (p) Load operation - Solar-Battery-Grid / Solar-Grid-Battery (to be set during installation). (q) Display Indications - Mode of Operation (Mains, Inverter, By pass) battery Voltage Panel Voltage, Current & Power Mains voltage, Current & Power inverter Panel. (r) IP Protection level - IP21. (s) Certifications - IEC 61683 for Efficiency IEC -(1,2,14,30) for Environmental Standard IEC 62109.			
	4.4. Battery Bank. (a) Battery bank Capacity @ C 10/ C 20 Rated. (b) Battery Technology - Pure Lead Tin VRLA Battery Tube Gel VRLA. (c) Battery Type - PLT- Valve Requested maintenance free type. (d) Each Cell Voltage - 2V/ 12V. (e) Certificates - IS 15549 or IEC 61427 (applicability as per capacity - OEM). **(i) Battery Housing Insulated Cover.** (aa) **Puff casing of adequate size with racks for placing the batteries with a Provision of opening and closing for battery maintenance. The roof should be incline at 45 deg with toughened glass on top for sun light to enter. Casing - Puff insulation material top. Glass - Toughened glass 8 mm - 10 mm venting Holes for voiding hydrogen accumulation.** **(ab) Steel frame to mount battery housing along with wind mill base and poles for grouting at the base. Frame - Stainless Steel. Long Pole - Stainless steel for supporting stainless steel frame.**			
	4.5 Vertical Axis Windmill - The type of wind mill shall be small wind vertical axis turbine. The cover material shall be UV resistant HDPE/PPE, Turbine material should be galvanized G-90 steel and rotor type should be vertical axis. **(a) Electrical and Mechanical parameters.** (i) Mill rated Power Output - 143 W (Minimum) @ 11 m/s. (ii) Wind Component Max Power Output - 500W (Minimum) @ 17 m/s. (iii) Voltage Range - Suitable for 24V / 48V DC Battery Charging. (iv) Maximum Current - 30 Amps in scalable modular architecture. (v) Cover material - UV resistant HDPE / PPE.			

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	(vi) Frame - Frame galvanized G-90 steel and Aluminum. (vii) Electronic Enclosure Rating - IP53. (viii) Generator - Permanent Magnet type. (ix) Rotor Diameter - 0.33 m. (x) Cut-in wind speed – 2.5 m/s. (xi) Swept Area - 0.980 m2 (height: 970mm, diameter: 330mm,Helical profile). (xii) Turbine Material - Glass Reinforced Plastic material. (xiii) Rotor Type - Vertical Axis. (xiv) Direction of Rotation - Anti - Clock wise. (xv) No. of turbines per Mill - 3 Turbines. (xv) Certificate-Low Voltage Directive 20056/95/EC (LVD) Electromagnetic. Comp atibility by CE. 2004/108/EC (EMC) & IEC 61400-2:2006. (xvi) Wind Turbine – The entire module of wind turbine must be mounted on a frame made of Galvanized G-90 Steel and Aluminum at a min height of 5' above ground level and with an arrangement for additional stability & weight at the base with grouting (or) fixing by tent hooks. **4.6**. **Junction Box.** (a) Material - Thermoplastic, dust, Vermin & Water proof. (b) Hardware - SS 304 Grade. (c) Cable Gland - Polyamide material in Required Size. (d) Protection - IP 65 enclosures with transparent covers with Surge Protection (MOV). (e) DC fuses - 1000V DC.			
	4.7. MC4 Connector. MC4 connectors are single-contact electrical connectors commonly used for connected solar panels. MC4 stands for the manufacture Multi-Contact and a 4 for the 4mm (diameter) contact pin. MC4s allow strings of panels to be easily constructed by pushing the connectors from adjacent panels together by hand, but require a tool to disconnect them to ensure they do not accidentally disconnect when the cables are pulled. The MC4 and compatible products are universal in the solar market today and compatible with standard type material **(a) Material Specifications.** (i) Type of connector - Solar PV Connector. (ii) Rated Current - 20 A. (iii) Rated Voltage - 1000V. (iv) Test Voltage - 6000v AC 1 min. (v) Typical Contact Resistance - <5m ohm. (vi) Degree of Protection - IP65. (vii) Contact Material - Copper. (viii) Insulation Material - PPO. (ix) Temperature range - -40 Degree Centigrade to +85 Degree Centigrade. (x) Suitable Cables Cross Section - 4 mm2 (20A).			
	4.8. **DC Rated Fuse**. DC Fuse mainly used in DC combiner box in solar PV systems. When PV panel or inverter causes overload or short circuit, it trips off immediately, to protect PV panels .DCfuse also used to protect other electrical parts in DC circuit, when overload or short circuit. DC fuse link a range of 10 x 38mm fuse links and Base specifically designed for protecting photovoltaic strings. These fuse links are capable of interrupting low over current associated with faulted photovoltaic string arrays (reverse current, multi-array fault). (a) **Features and Benefits.** (i) Specifically designed to protect solar power systems in extreme ambient temperature. (ii) Capable of withstanding high cycling and low level fault current conditions typical applications. (iii) Combiner boxes. (iv) PV Wire harnesses.			

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	4.9 . Copper Cables. Solar Cable is the interconnection cable used in photovoltaic power generation. A Solar Cable interconnects solar panels and other electrical components in the photovoltaic system. Matching step with the environment friendly shift the Solar Cable has been made which performs highest standards of application in its diverse usage. **(a) Properties**. A lifetime 'Partner' lasts up to 30 years even under tough condition. (i) Used in extreme weather conditions. (ii) Equipped with UV Resistance. (iii) Halogen-free : low smoke emission and low toxicity during fire. (iv) Flame & Fire retardant. (v) Flexibility & strip ability : for fast and easy installation. (vi) Easily Recyclable : in accordance with new Govt norms. (vii) Easy Installation: with colour identification; (viii) Suitable to common connector types. **(b) Features.** (i) Weather resistant. (ii) Ambient Temp: -40 Degree Centigrade to + 90 Degree Centigrade. (iii) Max Temp at conductor: 120 Degree Centigrade (20000h). (iv) Short circuit Temp: 200 Degree Centigrade at conductor (max. 5 sec) (v) Rated Voltage: 0.6/1 KV AC. Rated DC Voltage: 1.5 KV. (vi) Max permitted DC voltage: 1.8 KV (Conductor/ conductor, non-earthed system, circuit not under load).			
	(vii) Max permitted AC Voltage: 0.7/1.2KV Working Voltage: DC 1000V. Insulation Resistance: 1000 MW-km. (viii) Spark Test: 6000 Vac (8400 Vdc). (ix) Voltage with stand: 6500V as per EN50395 for 5 Min. **4.10. Earthing Practice**. Proper earthing practice to be carried out as per IS 30193:1987 should be separate earthing for wind turbine and solar modular **4.11. System Structure**. (a) **Material Specifications.** (i) Wind velocity withstanding capacity - 150 km/h. (ii) Structure material - Hot dip galvanized steel with galvanization thickness of min 80 micron or aluminum alloy. (iii) Bolts, nuts, fasteners, panel mounting- Stainless steel - SS 304. (iv) Mounting arrangement for flat roofs - Concrete ballast/ foundations made of fabricated PCC (1:2:4), M20/Anchor Festering. (v) Installation - The structures shall be designed for simple mechanical on-site installation. The on-side installation testing will be carried out by the Vender at ESD Sevoke/Site.			
	(vi) Minimum distance between roof edge and mounting structure (Horizontal Clearance) - >=0.50 metre. (vii) Minimum clearance between lowest part of panel and mounting structure (Vertical Clearance) -Shall not be less than 500mm. (viii) Access for panel cleaning and maintenance - All Solar panels must be accessible from the top for cleaning and from the bottom for access to the Junction box. (ix) Panel tilt angle - Tilt angle depending on location (south facing). (x) Warranty - As per MNRE for PV modules but 2 Years for Battery and Inverter for any manufacturing defects. **4.12. Codes, Standards & Makes for Hybrid Power System.** (a) Solar Photovoltaic Module - IEC61215, IEC61730, IEC61701. Make - Goldi Solar/ Vikram Solar/TATA Power Solar/Any reputed/Approved make. (b) Power Conditioning Unit - IEC 61683 or 62109.Make-Smarter/Statcon/ Growatt/ Any Reputed/Approved make. (c) Bty Bank - IS 15549 or IEC 61427. Make - Okaya/Explore/Exide /HBL/Any Reputed/ Approved make. (d) Windmill - Low Voltage directive 2006/95/EC (LVD) Electromagnetic compatibility 2004/108/EC/(EMC). Functionality and safety as per IEC 60670, JEC61400-12-1: 2005, IEC61400-2: 2006 Tested by NIWE or any Govt of India. Make – Windstream/ Any Reputed/ Approved make. (f) MC4 Connector - EN 50521 – Synergy Telecom/Any reputed/ approved make. (g) DC Rated fuse - IEC 60269 or IEC 60947 or 60898 - Any reputed/ approved make. (h) Copper Cables - For multi core flexible cables: IS 694, BS 6500, IEC 60227-Polycab/Havells/Any reputed/ approved make.			

Ser No	Brief Description	A/U	QTY	REMARKS
	(j) Earthing - As per IS 3043: 1987 - Any reputed/ approved make. (k) Module Mounting Structure - Galvanized with minimum 80 microns- Any reputed/ approved make.(Make. All the components viz Solar Panel and Wind turbine, Battery, Inverter shall be Make in India. OEM certificate assessed by QCI (Quality Council of India) will only be accepted along with National Institute of Wind Energy certificate or else the bids won't be accepted). **4.13. Design of Base Frame:** Design of frame should be such that it is joint with the plinth by base plates & with Nuts & Bolts. It should be feasible to dismantle/remove the frame so as to transport & install the Solar Hybrid System to safe place when not being utilised in forward & remote areas due to uncongenial weather conditions.			
	4.14 Construction Material (01 x SOLAR HYBRID POWER PLANT (5KW))			
	Ordinary Portland Cement (OPC) grade 43 conforming to IS 8112 Make - Ambuja/ACC/Ultratech or approved by E-in-C's Branch make list.	Bag	288.00	
	Stone aggregate shall be crushed stone 10mm-12mm graded conforming to IS-383-1970 and shall be clean hard tough, durable and of uniform quality throughout. The aggregate shall be free from soft disintegrated material, vegetable and other organic impurities.	Cum	20.00	
	4.15 General Conditions for Solar Hybrid Power Plant (a) **L1 vendor will provide spare stores in terms 02 (Two) nos of solar panel and 01 (One) no of battery in same specification alongwith each solar power system as backup for the solar system during breakdown/ breakages.** (b) The product shall have quality certification from National Institite of Wind Energy. (c) The product shall have quality certification from National Institite of Solar Energy. (d) The product shall approved by Quality council of India (e) All makes for Solar Panels shall comply to Approved list of module manufacturers by MNRE.			
	5. Construction Material			
	(a) Ordinary Portland Cement grade 43, IS-8112, packed in 50 Kgs HDPE bags conforming to IS11652/2000. Make : ACC/Ambuja/JK or E-in-C's Br approved make list.			
	(b) Sand shall be clean, sharp, angular hard and durable free from adherent coating and shall not contain clay, mica and other impurities. The maximum quantities of clay and fine silt in sand shall not be more than 5% by mass as per IS-383-1970 and grade conforming to Zone II to Zone III.			

Ser No	Brief Description	A/U	QTY	REMARKS
	(c) Stone aggregate shall be crushed stone 20mm graded conforming to IS-383 1970 and shall be clean hard tough, durable and of uniform quality throughout. The aggregate shall be free from soft disintegrated materials, vegetable and other organic impurities.			
	(d) Stone aggregate shall be crushed stone 40mm graded conforming to IS-383 1970 and shall be clean hard tough, durable and of uniform quality throughout. The aggregate shall be free from soft disintegrated materials, vegetable and other organic impurities.			
	(e) Hollow Block, PCC 1:2:4, size 400x200x200mm. (i) Hollow block shall conform to the requirement of IS-2185 (part-I) 2005. (ii) Tolerance. The maximum variation in dimension shall be not more than + 10mm for height, breadth and length (iii) Compressive strength of individual hollow block should not be less than 3.5N/mm2.			
	(f) Stone aggregate shall be crushed stone n exc 63mm graded conforming to IS-383 1970 and shall be clean hard tough, durable and of uniform quality throughout. The aggregate shall be free from soft disintegrated materials, vegetable and other organic impurities.			
	(g) Excavation, Returning & filling and Removing as per SSR Pt-I.			
	6. <u>Makes.</u> (a) Cement :Ultratech/ Ambuja/ Jaypee/ Shree/ ACC. (b) TMT bar:TATA/SAIL/JINDAL (c) Steel Plates: TATA/SAIL/JINDAL (c) Quick setting compound:JK/dr. fixit/Duroseal/Imperial (d) PBS Roll :Shalimar/ IWL /National (e) Loop hole & teel door:SAIL/TATA/JINDAL. (f) Paint:Asian Paints/ Berger/ Nerolac/ Shalimar (g) Lightening conductor:Radiance powercom/Ennov/Ashlok/ Electromax.			

Ser No	Brief Description	A/U	QTY	REMARKS
	7. Test Certificate from Govt approved lab and manufacturers certificate of the approved makes to be submitted/provided by vendors during tech evaluation stage for the following items:- (a) TMT bars (b) Cement (c) MS plate 10mm thick. (d) MS plate 20mm thick (e) Shredded rubber 150mm			
	8 Note:-			
	(i) Rates to be quoted to be inclusive of transportation/delivery charges at the site appropriate loc.			
	(ii) Rate quoted against the item whose specification/make/details are not mentioned but taken by vendor himself, to be mentioned under the remarks column by the vendor to avoid any ambig			
	(iII) All items/material to be conforming to IS specifications/standards, where ever not mentioned.			
	(Iv) RCC walls, columns & Roof slabs must qualify criteria of minimum reinforcement as per IS :456-2000.			
	(vi) Details missing, if any, will be assumed to be provided by the supplier as per good engineering practice and will be approved by inspection team of consignee as per manufacturer standarc			
	(vii) All mtrl reqd for the manufacture of **RCC PDs/CPs/ Gen Set Canopy** shall be new and comply with relevant bureau of IS specification.			
	(viii) Contractor is fully responsible for supply, transportation, installation, erection, testing and commissioning and smooth run of the equipment till the maintenance periods mentioned against			
	(ix) Certificate for Quality Assurance will be provided by the contractor on demand by the OC, 426 (Independent) Field Company.			

Ser No	Brief Description	A/U	QTY	REMARKS
	(x) Minor addition/deletion/ changes will be done at the direction of Officer Commanding, 426 (Independent) Field Company and will be carried out without any additional cost at the time of exe			
	(xi) Execution will be carried out as per IS provision / Standard Engineer practices.			
	(xii) All parts to be clearly marked as per construction sequence and Job No to be mentioned on each part.			
	(xiii) Any omission / Error in specs, Drawing is deemed to be considered included/ Corrected as per std and Good Engineering practice. Decision of OC, 426 (Independent) Field Company in c			
	(xiv). Shredded Rubber (Crumb Rubber Tiles) of Size 500mm x 500mm x 150mm made of granules polyurethane polymerically bonded with hardness of A60 and Tensile Strength of 1:29 MPA			
	(xv). The M S Steel plates 10mm and 20 mm thick can be cut into suitable size of faciliate carriage and welding will be done while fixing to covered the entire area of the roof as per decision of			
	(xiv) Supplier will be solely responsible for timely provision of stores and unit will not be responsible in any manner for Govt expenses.			

Ser No	Brief Description	A/U	QTY	REMARKS
	(xv) The contractor will provide all the drawing (in A3 size paper) to incl general arrangement construction drawing, foundation details and fabrication drawings duly certified from authorized structural designer to be submitted during technical evaluation stage. Certificate of authorizer of structural design should be submitted at the same time			
	(xvi) No Accommodation is provided for labours/executives for execution of work. Accn is responsibility of Contractor.			
	(xvii) All maintenance and replacements shall be onsite. The company shall provide routine on site checkup in every 90 days apart from attending the complaints if any by the users.			
	(xviii) Temp Store, Site Office and Labs shall be arranged by the contractor at his own arrangement. No extra payment shall be made for the same.			
	(xix) Electrical connections and water supply required for the execution of work shall be arranged by the contractor at his own cost/arrangement. Electrical connections and water meters and connection shall be erected by contractor. It is the responsibility of contactor for paying electricity and water bills. No extra payment shall be made for the same.			
	(xx) Vendor will provide commissioning certificate after installation of the Solar power plant.			
	(xxi) Vendor will provide earthing for the Solar power plant.			

STORE LIST FOR 04 x ADL(PD)

Ser No	Items	A/U	Qty for 01xPDs	OTY 16 X PDS	Remarks
1	Ordinary Portland Cement grade 43, IS-12269-1990, packed in 50 Kgs HDPE bags conforming to IS 11652/2000. Make : ACC/Ambuja/JK/Ultra tech.	Bags	121.00	1,936.00	
2	Stone aggregate shall be crushed stone 20mm graded conforming to IS-383 1970 and shall be clean hard tough, durable and of uniform quality throughout. The aggregate shall be free from soft disintegrated materials, vegetable and other organic impurities.	Cum	10.25	164.00	
3	Coarse Sand shall be clean, sharp, angular hard and durable free from adherent coating and shall not contain clay, mica and other impurities. The maximum quantities of clay and fine silt in sand shall not be more than 5% by mass as per IS-383-1970 and grade shall comply with Zone-II to Zone III.	Cum	12.65	202.40	
4	Stone aggregate shall be crushed stone 40mm graded conforming to IS-383 1970 and shall be clean hard tough, durable and of uniform quality throughout. The aggregate shall be free from soft disintegrated materials, vegetable and other organic impurities.	Cum	0.64	10.24	
5	RR Stone	Cum	15.81	252.96	
6	TMT steel bar 16mm dia **Make :- TATA/SAIL/JINDAL**	Kg	123.00	1,968.00	
7	TMT steel bar 12mm dia **Make :- TATA/SAIL/JINDAL**	Kg	760.00	12,160.00	
8	TMT steel bar 10mm dia **Make :- TATA/SAIL/JINDAL**	Kg	145.00	2,320.00	
9	TMT steel bar 8 mm dia **Make :- TATA/SAIL/JINDAL**	Kg	80.00	1,280.00	
10	Binding wire 20 gauge 0.9mm annealed **Make :- TATA/SAIL/ISPAT**	Kg	21.00	336.00	
11	Shuttering water proof plywood of size 8' x 4' and 12mm thickness.	No's	15.00	240.00	
12	Nails 2" for shuttering	Kg	15.00	240.00	
13	Nails 3" for shuttering	Kg	10.00	160.00	
14	Nails 5" for shuttering	Kg	7.00	112.00	
15	Quick setting compound **Make :- Fosroc/JK/pidilite/Acualac/Duracem**	Ltr	11.00	176.00	
16	2nd class hardwood plain fillets for form work,square section 50mmx50mm length 3.0m	No's	20.00	320.00	

Ser No	Items	A/U	Qty for 01xPDs	OTY 16 X PDS	Remarks
17	Wooden ballies 75mm-100 mm dia 3M long	No's	15.00	240.00	
18	PBS Roll IS 1322-62 weight min 3 Kgs/Sqm and minimum length 10 Mtr width 1m laid on primed surface by forced application. **Make :- SHALIMAR/MACEFELT/IWL CHENNAI /NATIONAL**	No's	5.00	80.00	
19	Bitumen, blown type, 85/25 grade primer for roof treatment	Kg	60.00	960.00	
20	Water proofing compound	Ltr	15.00	240.00	
21	HDPE film of 400 micron thickness as per IS- 2508 (Transparent Colour)	Sqm	50.00	800.00	
22	Loop holes of size 600x500mm with a trapenzodial frame shall be make of angel iron 50x506mm and flat iron 40x6 mm covered with 3 mm thick mild steel sheet from inside on four sides excepts outer and inner opening with four Nos hold fast size 200x50x6mm flat iron two on either side with two ends mild steel door made of 8 mm thick mild steel plate 600x500mm with sliding slit of 75x75mm on one door. The doors shluld be fixed with required Nos of heavy duty box hinges of 100 mm size with the dimension of outer opening of the loop hole box being 900 mm x 700mm. MS tower bolt two Nos 16 mm dia 200 mm long to be provided to shut the door. The door should be sliding openable with locking arranment in the form of hook to prevent the door from closing back again whenever requried. Edges of the loop holes to be chamfered evenly. Make : TATA, SAIL	No's	3.00	48.00	
23	Wooden scantling 3.20M long section 100x75mm	No's	4.00	64.00	
24	Steel door of size 900x1800 mm shall be provided as per drawing. Main frame work shall be of MS angle 50x50x6 mm. MS sheet 2mm thick shall be provided as cladding of the door with flat iron 25x4 mm bracing including locking be open-able inwards. The door shall have sliding opening 900mmx250mm made of 14 gauge MS sheet with handle with 04 gaurds bars at 1200mm from from bottom . Necessary handles and other fittings will be provided both sides of door. The door frame will have 06 Nos hold fast 200 mm long made of 50x6 mm flat iron. job No will be engraved on the inner side. All steel parts shall be confirming to IS-226 and pre painted with two coats of OG colour over one coats of red oxide. **Make :- SAIL/TATA/ISPAT/LLOYD/JINDAL.**	No's	1.00	16.00	

Ser No	Items	A/U	Qty for 01xPDs	OTY 16 X PDS	Remarks
25	Lightning Conductor made of copper Tube 150 cm long x 25mm dia with five copper prongs of length 15cm each fixed to copper ball of dia 50mm and 4mm thick with securing arrangement. Bottom 40cm portion of the copper tube will be covered with PVC insulating material to avoid direct contact between the building and the lightening conductor. GI plate of 60cm x60cm x 3mm will be provided for earthing purpose and will be placed 2.5m below.GL. GI Plate and copper conductor will be connected by using 4mm dia GI conductor wire .GI conductor wire will pass through PVC conduct pipe to avoid direct contact between building and GI wire. Necessary insulated MS clamps for fitting PVC conduit pipe with building will be provided. For effective earthing of the struck lighting moisture near GI plate needs to be maintained moisture will be maintain by covering GI plate with 15cm alternative layers of salt and charcoal as per details given in the drawing att. Two GI funnel fixed with20mm dia GI pipe of length 1.5m will be provided for passing GI conductor wire and supplying water at 2.5m depth. Man hole will be covered by using PVC cover of size 65cm x65cm over PCC pit. 15cm long Termination point aluminium strip of size 25mm x3mm having holes at both ends for fixing GI conductor wire coming from copper tube and GI plate with suitable nuts and bolts, will be provided at plinth level to check thy resistance of the earthing. **Note** Lightening arrester shall be conform with IS -2309:1989.	Each	1.00	16.00	
26	Supply only Stainless Steel premium fesue dual edge 8 pin cloth hanger to be fixed o n wall hooks Make : iSTAR	Nos	2.00	32.00	
27	Supply MS round Pipe 150mm dia of medium class for ventilation/Bukhari outlet Dia Make : Apollo or equivalent	RM	0.50	8.00	
28	Supply MS round Pipe 20mm dia of medium class for telehphone outlet Make : Apollo or equivalent	RM	2.30	36.80	
29	Pre- painted galvalume aluminum zinc coating GI based corrugated steel sheet 0.60mm thick of an colour having tensile strength of 550 Mpa as in roof covering/cladding to wall, fixed with self tapping screws.Make TATA/BHUSHAN/ESSAR	Sqm	1.20	19.20	
30	75mm dia PVC pipe for weep hole **Make :- SUPREME/KISSAN/PRINCE.**	RM	10.00	160.00	
32	MS Plate 10 mm for roofing layer. All steel surfaces shall be painted with two coats of synthetic enamel paint over a coat of zinc primer**. Make : SAIL/TATA/JINDAL/RINL**	Kg	400.00	6,400.00	
33	MS Plate 20 mm for roofing layer. All steel surfaces shall be painted with two coats of synthetic enamel paint over a coat of zinc primer**. Make : SAIL/TATA/JINDAL/RINL**	Kg	1,601.00	25,616.00	
34	Shredded rubber 150 mm (Crumb Rubber Tiles size 500 x 500 x 50 mm in three layers) made of granules polyurethane polymerically bonded with hardness of A60 and Tensile strength of 1.29 Mpa.	Sqm	5.00	80.00	

STORE LIST PD ELECTRIC ITEMS (04 x ADL(PD)

Ser No	Items	A/U	01 X QTY	16XPDS QTY	Remarks
1	PVC single core, 1.5 Sqmm FR type stranded copper wire Make Havells/ Anchor/Finolex with ISI mark. (Red & Black Colour)	Roll	1.00	16.00	
2	PVC single core, 2.5 Sqmm FR type stranded copper wire Make Havells/ Anchor/Finolex with ISI mark. (Red & Black Colour).	Roll	1.00	16.00	
3	Cable PVC insulated and PVC 1100V GRADE four Core with stranded copper conductor confirming to IS 694-1990 of size 16 sqmm.	RM	15.00	240.00	
4	PVC conduit pipe round shape 50 mm dia and 3.00 mm confirming to IS 14927 (part-ii)	RM	18.00	288.00	
5	PVC L bend for 20 mm conduit pipe confirming to IS 371 1979	Nos	5.00	80.00	
6	PVC 'T' 20 mm for conduit pipe	Nos	5.00	80.00	
7	PVC square box 4"X4"	Nos	4.00	64.00	
8	PVC Elbow 20 mm dia confirming to IS 9537(part-III) -1983	Nos	5.00	80.00	
9	Dry Wall Screw 50 mm long (per pkt-100 Nos) confirming to IS 723-1973 with wooden pegs (25mm Long - 14 Pkt), (50mm - 8 Pkt) (20mm - 8 Pkt)	Pkt	1.00	16.00	
10	MCB single pole 230V AC, 50 Hz, 6 Ampc, 10 Amp confirming to IS :8828-1996 IEC 60898:2002, suitable for lighting & other domestic loads.	Nos	4.00	64.00	
11	Switch piano flush type15 Amp, socket multi purpose 5/15 Amp Piano Type with gang box Make Anchor/ Havells/ Phillips with ISI mark.	Nos	4.00	64.00	
12	PVC ceiling rose 2/3 terminal	Each	4.00	64.00	
13	Insulation tape 25 mm width 9 mtr long ISI marked Make : Steel grip	Roll	1.00	16.00	
14	Distribution box (MCB Box) 12 way Factory made, Powder coated, Double door IP-42 with 200 Amp copper busbar Make : Havells/Anchor/Legrand	Nos	1.00	16.00	
15	Stainless steel U clamp for 20 mm PVC conduit pipe.	Nos	25.00	400.00	
16	Isolator 63 Amp DP Make Anchor/Havells/Phillips with ISI mark.	Nos	1.00	16.00	
17	Earthing of building provided using 3 mm dia GI earth wire connecting to main board to GI earth plate of size 60cm x60cm 6mm thick, Necessary porcelain insulated M clamps for fitting copper tube & copper conductor, 25Kg Wood charcoal granular size not less than 10mm (in HDPE bags), 25kg edible rock salt granulars (in HDPE bags) with man hole cover of size 45cm x45cm over PCC pit of inner size 30cm x30cmx30cm deep with 7.5cm concrete wall thickness will be provided and GI funnel fixed with 20mm dia GI pipe upto 1.0mtr depth. The depth of earthing pit will be 2.25m deep below GL. Aluminium conductor strip connecting copper tube and GI earth plate will be 25mm x3mm thick with rubber insulation including necessary fixing clamps with walls. Termination point with 15cm long aluminium strip 25mm x 3mm thick holes at ends for fixing aluminium conductor strip from earth plate and copper tube from roof with the help of suitable size nut & bolts will be made at plinth level to check the resistance of the earthing.Earthing specification conforming to IS code 3043.	Job	1.00	16.00	

STORE LIST FOR 04 X ADL(CP)

Ser No	Items	A/U	Qty for 01xCPs	04 X QTY	Remarks
1	Ordinary Portland Cement grade 43, IS-12269-1990, packed in 50 Kgs HDPE bags conforming to IS 11652/2000. Make : ACC/Ambuja/JK/Ultra tech.	Bags	228.00	912.00	
2	Stone aggregate shall be crushed stone 20mm graded conforming to IS-383 1970 and shall be clean hard tough, durable and of uniform quality throughout. The aggregate shall be free from soft disintegrated materials, vegetable and other organic impurities.	Cum	23.00	92.00	
3	Coarse Sand shall be clean, sharp, angular hard and durable free from adherent coating and shall not contain clay, mica and other impurities. The maximum quantities of clay and fine silt in sand shall not be more than 5% by mass as per IS-383-1970 and grade shall comply with Zone-II to Zone III.	Cum	16.00	64.00	
4	Stone aggregate shall be crushed stone 40mm graded conforming to IS-383 1970 and shall be clean hard tough, durable and of uniform quality throughout. The aggregate shall be free from soft disintegrated materials, vegetable and other organic impurities.	Cum	2.00	8.00	
5	RR Stone	Cum	12.00	48.00	
6	TMT steel bar 16mm dia **Make :- TATA/SAIL/JINDAL**	Kg	275.00	1100.00	
7	TMT steel bar 12mm dia **Make :- TATA/SAIL/JINDAL**	Kg	1435.00	5740.00	
8	TMT steel bar 10mm dia **Make :- TATA/SAIL/JINDAL**	Kg	310.00	1240.00	
9	TMT steel bar 8 mm dia **Make :- TATA/SAIL/JINDAL**	Kg	96.00	384.00	
10	Binding wire 20 gauge 0.9mm annealed **Make :- TATA/SAIL/ISPAT**	Kg	28.00	112.00	
11	Nails 2" for shuttering	Kg	15.00	60.00	
12	Nails 3" for shuttering	Kg	12.00	48.00	
13	Nails 5" for shuttering	Kg	10.00	40.00	
14	Quick setting compound **Make :- Fosroc/JK/pidilite/Acualac/Duracem**	Ltr	30.00	120.00	
15	2nd class hardwood plain fillets for form work,square section 50mmx50mm length 3.0m	No's	30.00	120.00	
16	Wooden ballies 75mm- 100 mm dia 3M long	No's	25.00	100.00	
17	PBS Roll IS 1322-62 weight min 3 Kgs/Sqm and minimum length 10 Mtr width 1m laid on primed surface by forced application. **Make :- SHALIMAR/MACEFELT/IWL CHENNAI /NATIONAL**	No's	5.00	20.00	
18	Bitumen, blown type, 85/25 grade primer for roof treatment	Kg	60.00	240.00	

19	Water proofing compound Make: Cicoo/Sika/Duroseal	Ltr	15.00	60.00	
20	HDPE film of 400 micron thickness as per IS- 2508 (Transparent Colour)	Sqm	50.00	200.00	
21	Synthetic enamel paint colour as approved by OC 426(I) Fd Coy. Make Asain/Berger/Shalimar	Ltr	30.00	120.00	
22	Turpentine Oil	Ltr	10.00	40.00	
23	Loop holes of size 600x500mm with a trapenzodial frame shall be make of angel iron 50x506mm, 45x45x6 mm and flat iron 40x6 mm covered with 2 mm thick mild steel sheet from inside on four sides excepts outer and inner opening with four Nos hold fast size 200x50x6mm flat iron two on either side with two ends mild steel door made of 8 mm thick mild steel plate 400x480mm with sliding slit of 75x75mm on one door. The doors shluld be fixed with required Nos of heavy duty box hinges of 100 mm size with the dimension of outer opening of the loop hole box being 900 mm x 600mm. MS tower bolt two Nos 16 mm dia 200 mm long to be provided to shut the door. The door should be opening inside with locking arranment in the form of hook to prevent the door from closing back again whenever requried. Edges of the loop holes to be chamfered evenly. Make : TATA, SAIL	No's	3.00	12.00	
24	Steel door of size 900x1800 mm shall be provided as per drawing. Main frame work shall be of MS angle 50x50x6 mm. MS sheet 2mm thick shall be provided as cladding of the door with flat iron 25x4 mm bracing including locking be open-able inwards. The door shall have sliding opening 900mmx250mm made of 14 gauge MS sheet with handle with 04 gaurds bars at 1200mm from from bottom . Necessary handles and other fittings will be provided both sides of door. The door frame will have 06 Nos hold fast 200 mm long made of 50x6 mm flat iron. job No will be engraved on the inner side. All steel parts shall be confirming to IS-226 and pre painted with two coats of OG colour over one coats of red oxide. **Make :- SAIL/TATA/ISPAT/LLOYD/JINDAL.**	No's	1.00	4.00	
25	Lightning Conductor made of copper Tube 150 cm long x 25mm dia with five copper prongs of length 15cm each fixed to copper ball of dia 50mm and 4mm thick with securing arrangement. Bottom 40cm portion of the copper tube will be covered with PVC insulating material to avoid direct contact between the building and the lightening conductor. GI plate of 60cm x60cm x 3mm will be provided for earthing purpose and will be placed 2.5m below.GL. GI Plate and copper conductor will be connected by using 4mm dia GI conductor wire .GI conductor wire will pass through PVC conduct pipe to avoid direct contact between building and GI wire. Necessary insulated MS clamps for fitting PVC conduit pipe with building will be provided. For effective earthing of the struck lighting moisture near GI plate needs to be maintained moisture will be maintain by covering GI plate with 15cm alternative layers of salt and charcoal as per details given in the drawing att. Two GI funnel fixed with20mm dia GI pipe of length 1.5m will be provided for passing GI conductor wire and supplying water at 2.5m depth. Man hole will be covered by using PVC cover of size 65cm x65cm over PCC pit. 15cm long Termination point aluminium strip of size 25mm x3mm having holes at both ends for fixing GI conductor wire coming from copper tube and GI plate with suitable nuts and bolts, will be provided at plinth level to check thy resistance of the earthing. Schematic layout of lighting conductor is attached. Note Lightening arrester shall be conform with IS -2309:1989.(Note:- Only aluminium Strips (not GI), Necessary Nuts & Bolts & Plastic Glits)	Each	1.00	4.00	

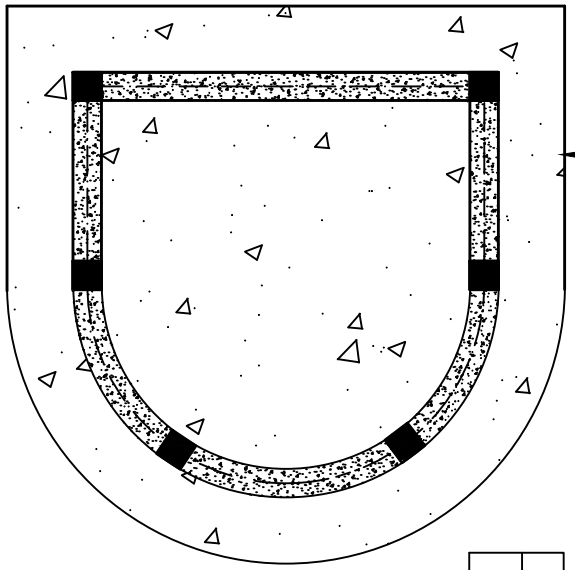
26	MS Plate 10 mm for roofing layer. All steel surfaces shall be painted with two coats of synthetic enamel paint over a coat of zinc primer. **Make : SAIL/TATA/JINDAL/RINL**	Kg	524.00	2096.00	
27	MS Plate 20 mm for roofing layer. All steel surfaces shall be painted with two coats of synthetic enamel paint over a coat of zinc primer. **Make : SAIL/TATA/JINDAL/RINL**	Kg	2094.00	8376.00	
28	Shredded rubber 150 mm (Crumb Rubber Tiles size 500 x 500 x 50 mm in three layers) made of granules polyurethane polymerically bonded with hardness of A60 and Tensile strength of 1.29 Mpa.	Sqm	8.29	33.16	
29	75mm dia PVC pipe for weep hole **Make :- SUPREME/KISSAN/PRINCE.**	RM	12.00	48.00	

STORE LIST CP : ELECTRIC ITEMS FOR 04 X ADL(CP)

Ser No	Items	A/U	01 X Qty	04 X QTY	Remarks
1	PVC single core, 1.5 Sqmm FR type stranded copper wire Make Havells/ Anchor/Finolex with ISI mark. (Red & Black Colour)	Roll	1.00	4.00	
2	PVC single core, 2.5 Sqmm FR type stranded copper wire Make Havells/ Anchor/Finolex with ISI mark. (Red & Black Colour).	Roll	1.00	4.00	
3	Cable PVC insulated and PVC 1100V GRADE four Core with stranded copper conductor confirming to IS 694-1990 of size 16 sqmm.	RM	1.00	4.00	
4	PVC conduit pipe round shape 50 mm dia and 3.00 mm confirming to IS 14927 (part-ii)	RM	4.00	16.00	
5	PVC L bend for 20 mm conduit pipe confirming to IS 371 1979	Nos	5.00	20.00	
6	PVC 'T' 20 mm for conduit pipe	Nos	5.00	20.00	
7	PVC square box 4"X4"	Nos	4.00	16.00	
8	PVC Elbow 20 mm dia confirming to IS 9537(part-III) -1983	Nos	5.00	20.00	
9	Dry Wall Screw 50 mm long (per pkt-100 Nos) confirming to IS 723-1973 with wooden pegs (25mm Long - 14 Pkt), (50mm - 8 Pkt) (20mm - 8 Pkt)	Pkt	1.00	4.00	
10	MCB single pole 230V AC, 50 Hz, 6 Ampc, 10 Amp confirming to IS :8828-1996 IEC 60898:2002, suitable for lighting & other domestic loads.	Nos	4.00	16.00	
11	Switch piano flush type15 Amp, socket multi purpose 5/15 Amp Piano Type with gang box Make Anchor/ Havells/ Phillips with ISI mark.	Nos	4.00	16.00	
12	PVC ceiling rose 2/3 terminal	Each	4.00	16.00	
13	Insulation tape 25 mm width 9 mtr long ISI marked Make : Steel grip	Roll	1.00	4.00	
14	Distribution box (MCB Box) 12 way Factory made, Powder coated, Double door IP-42 with 200 Amp copper busbar Make : Havells/Anchor/Legrand	Nos	1.00	4.00	
15	Stainless steel U clamp for 20 mm PVC conduit pipe.	Nos	10.00	40.00	
16	Isolator 63 Amp DP Make Anchor/Havells/Phillips with ISI mark.	Nos	1.00	4.00	
17	Earthing of building provided using 3 mm dia GI earth wire connecting to main board to GI earth plate of size 60cm x60cm 6mm thick, Necessary porcelain insulated M clamps for fitting copper tube & copper conductor, 25Kg Wood charcoal granular size not less than 10mm (in HDPE bags), 25kg edible rock salt granulars (in HDPE bags) with man hole cover of size 45cm x45cm over PCC pit of inner size 30cm x30cmx30cm deep with 7.5cm concrete wall thickness will be provided and GI funnel fixed with 20mm dia GI pipe upto 1.0mtr depth. The depth of earthing pit will be 2.25m deep below GL. Aluminium conductor strip connecting copper tube and GI earth plate will be 25mm x3mm thick with rubber insulation including necessary fixing clamps with walls. Termination point with 15cm long aluminium strip 25mm x 3mm thick holes at ends for fixing aluminium conductor strip from earth plate and copper tube from roof with the help of suitable size nut & bolts will be made at plinth level to check the resistance of the earthing.Earthing specification conforming to IS code 3043.	Job	1.00	4.00	

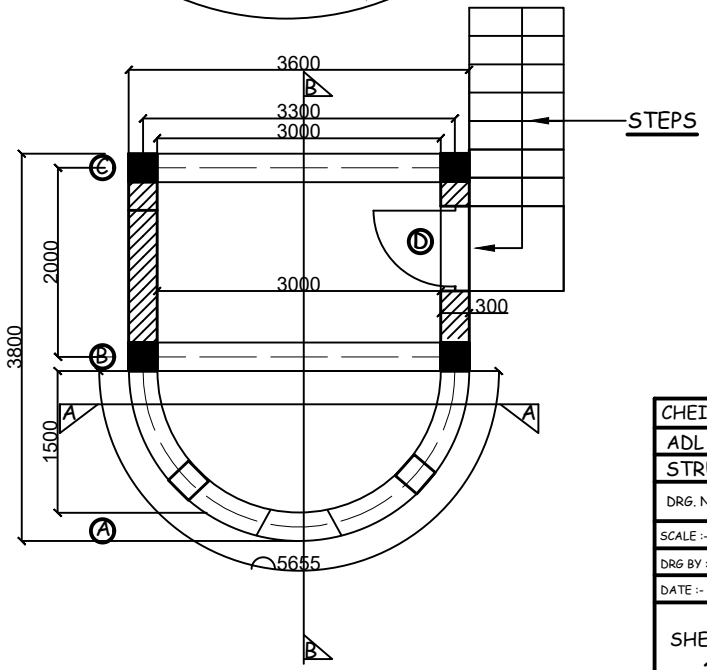
STORE LIST FOR 04 x ADL (Fd Elect (Hybrid/Solar 5 KW)

Ser No	Brief Description	A/U	01 X Qty	04 X QTY	Remarks
1	Ordinary Portland Cement (OPC) grade 43 conforming to IS 8112 Make - Ambuja/ACC/Ultratech	Bag	72.00	288.00	
2	Stone aggregate shall be crushed stone 10mm-12mm graded conforming to IS-383-1970 and shall be clean hard tough, durable and of uniform quality throughout. The aggregate shall be free from soft disintegrated material, vegetable and other organic impurities.	Cum	5.00	20.00	
3	Coarse sand, sand shall be clean, sharp, angular hard and durable free from adhere and coaling and shall not contain clay, mica and other impurities. The maximum quantities of clay and fine sand shall not be more than 5% by mass as per IS-383-1970 and grade shall comply with Zone II to zone III.	Cum	8.22	32.88	
4	Stone aggregate shall be crushed stone 20mm graded conforming to IS-383-1970 and shall be clean hard tough, durable and of uniform quality throughout. The aggregate shall be free from soft disintegrated material, vegetable and other organic impurities.	Cum	2.32	9.28	
5	Stone aggregate shall be crushed stone 40mm graded conforming to IS-383-1970 and shall be clean hard tough, durable and uniform quality throughout. The aggregate shall be free from soft disintegrated material, vegetable and other organic impurities.	Cum	3.57	14.28	



FOUNDATION PLAN : CP (W/ 155OHP)

SCALE 1:100

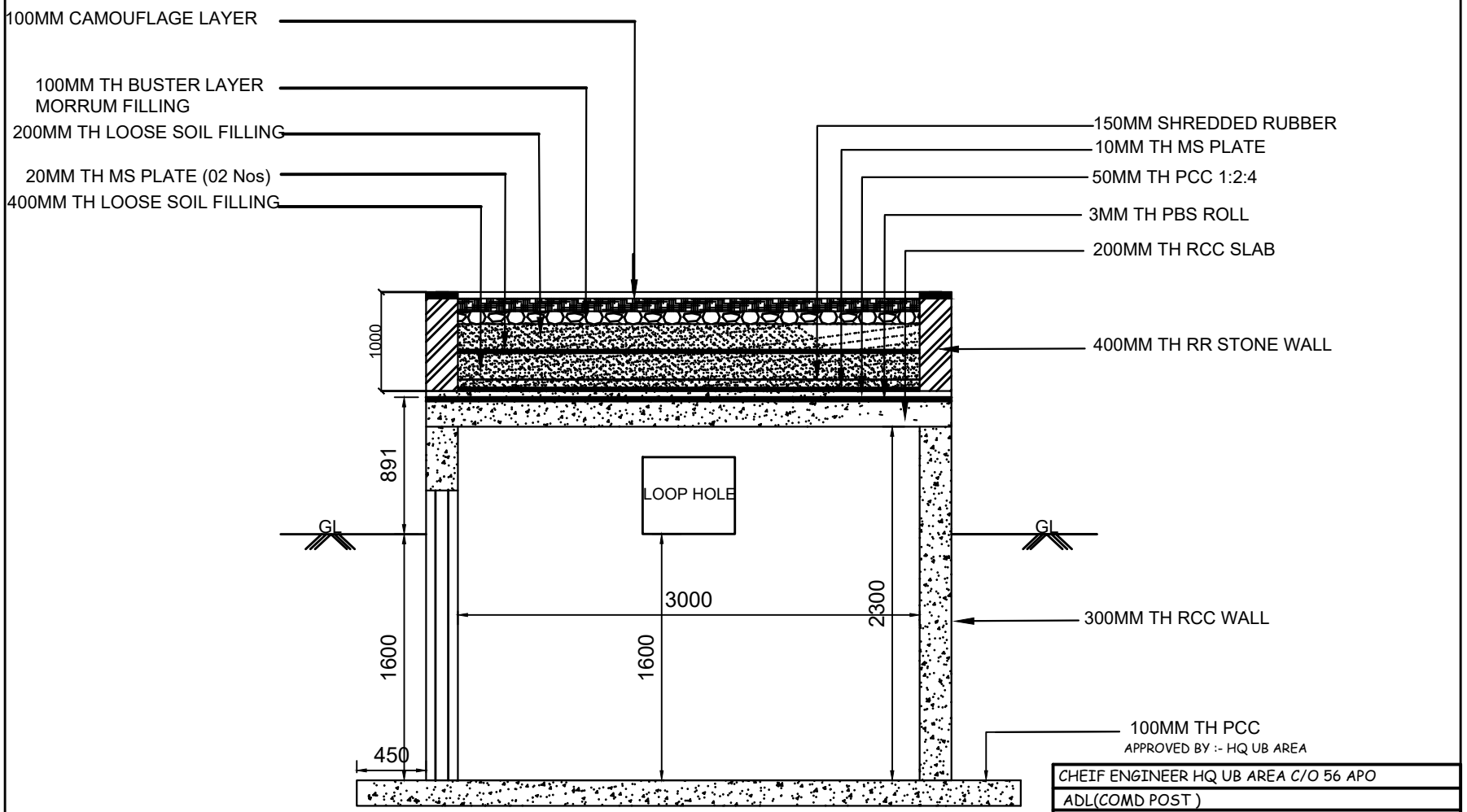


PLAN : CP (W/ 155OHP)

SCALE 1:100

APPROVED BY :- HQ UB AREA

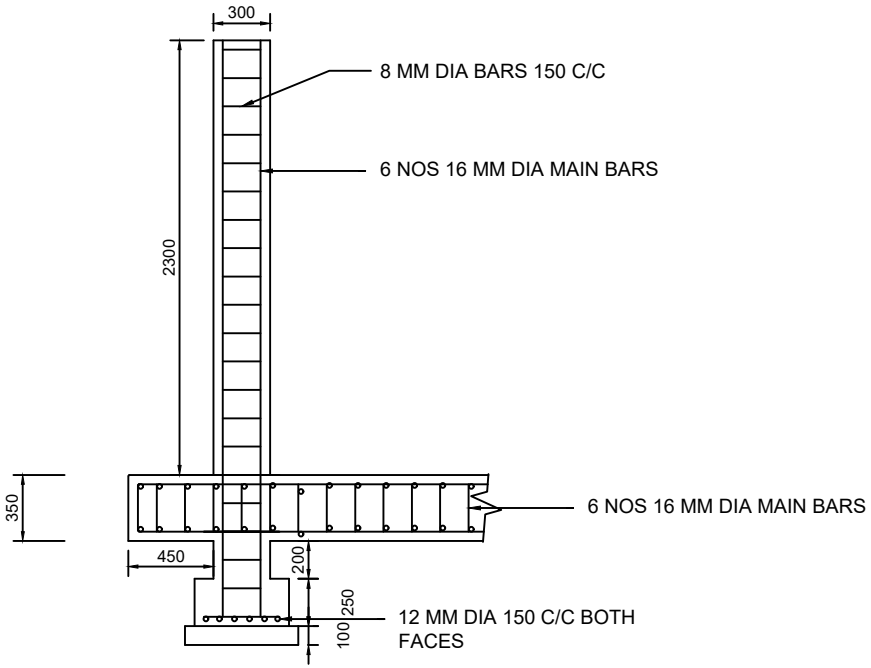
CHEIF ENGINEER HQ UB AREA C/O 56 APO		
ADL (COMD POST)		
STRUCTURAL DETAILS		
DRG. NO. :- ADL / /426 (I) FD COY		
SCALE :- AS SPECIFIED	JOB NO.	
DRG BY : Sub V D Chavan		
DATE :- APR 2026		
SHEET NO. 1/4		



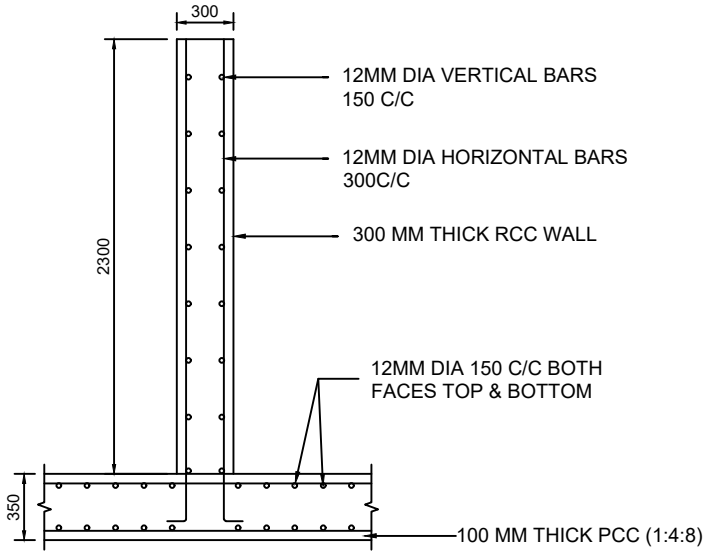
DETAILS OF ROOF LAYER

SCALE 1:10

CHEIF ENGINEER HQ UB AREA C/O 56 APO		
ADL(COMD POST)		
SECTION AT A-A		
DRG. NO. :- ADL / /426 (I) FD COY		
SCALE :- AS SPECIFIED	JOB NO.	
DRG BY : Sub V D Chavan		
DATE :- APR 2026		
SHEET NO. 2/4		



COLUMN FOUNDATION
SCALE :- 1:50

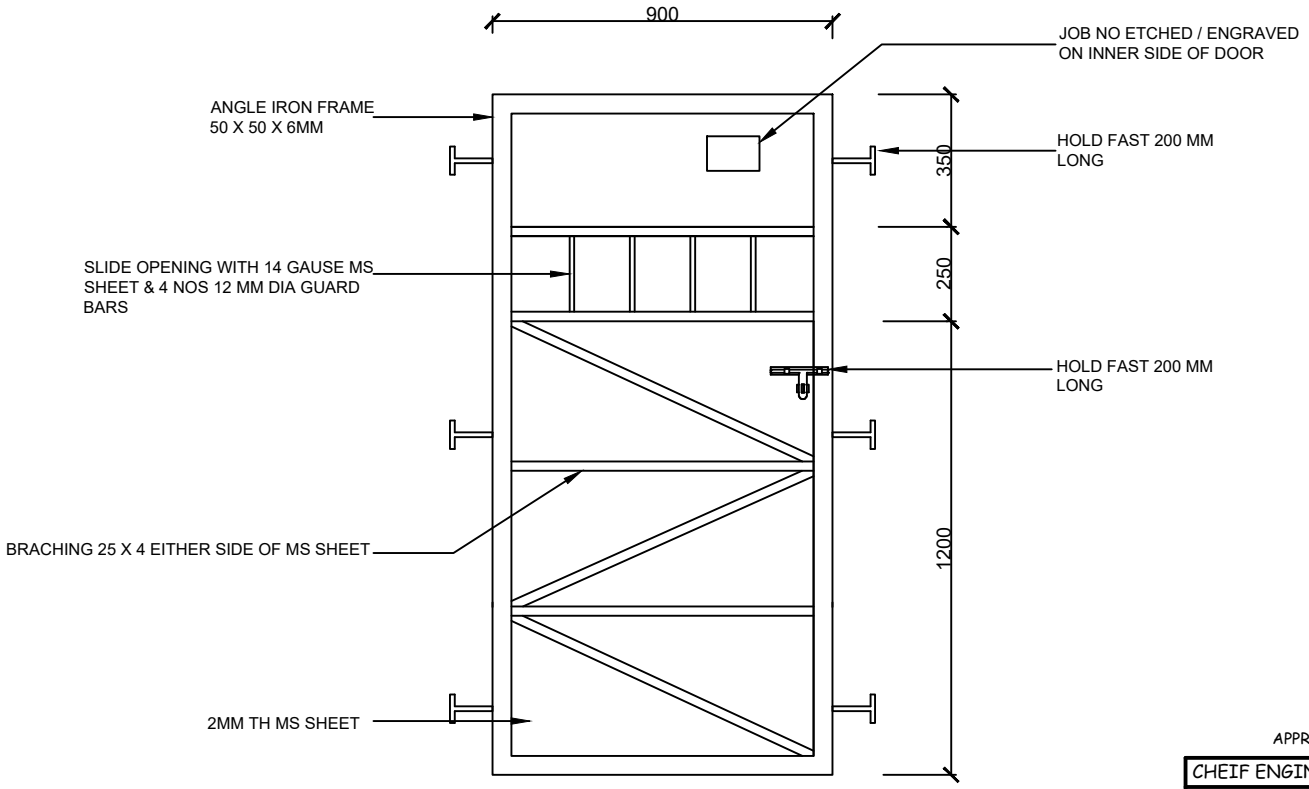


COLUMN FOUNDATION
SCALE :- 1:50

APPROVED BY :- HQ UB AREA

CHEIF ENGINEER HQ UB AREA C/O 56 APO		
ADL (COMD POST)		
STRUCTURAL DETAILS		
DRG. NO. :- ADL / /426 (I) FD COY		
SCALE :- AS SPECIFIED	JOB NO.	
DRG BY :		
DATE :-		
SHEET NO. 3/4		

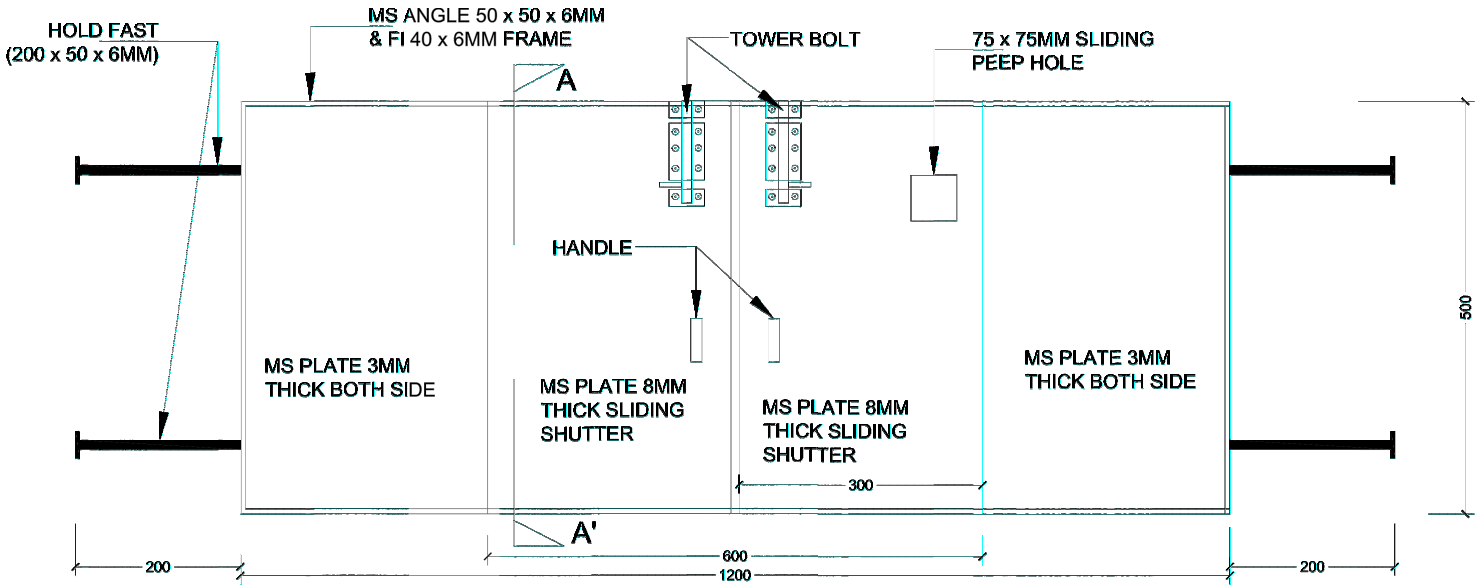
NOTE :-
All dimension are in mm



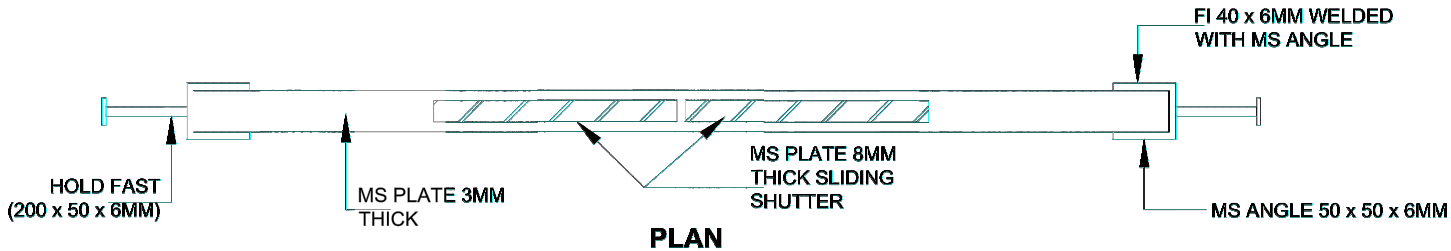
APPROVED BY :- HQ UB AREA

CHEIF ENGINEER HQ UB AREA C/O 56 APO		
ADL (COMD POST)		
STEEL DOOR 900 X 1800MM		
DRG. NO. :-ADL/ /426 (I) FD COY		
SCALE :- AS SPECIFIED	JOB NO. 5125/25-26	
DRG BY : Sub V D Chavan		
DATE :- APR 2026		
SHEET NO. 4/4		

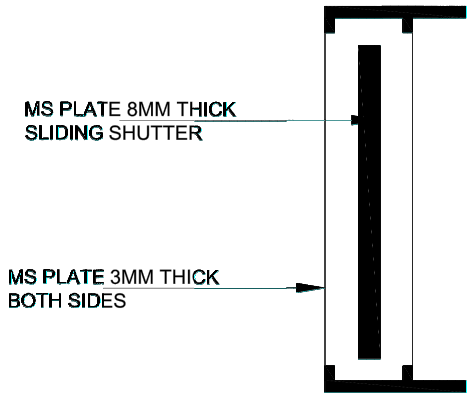
NOTE :-
ALL DIMENSION ARE IN MM



FRONT ELEVATION



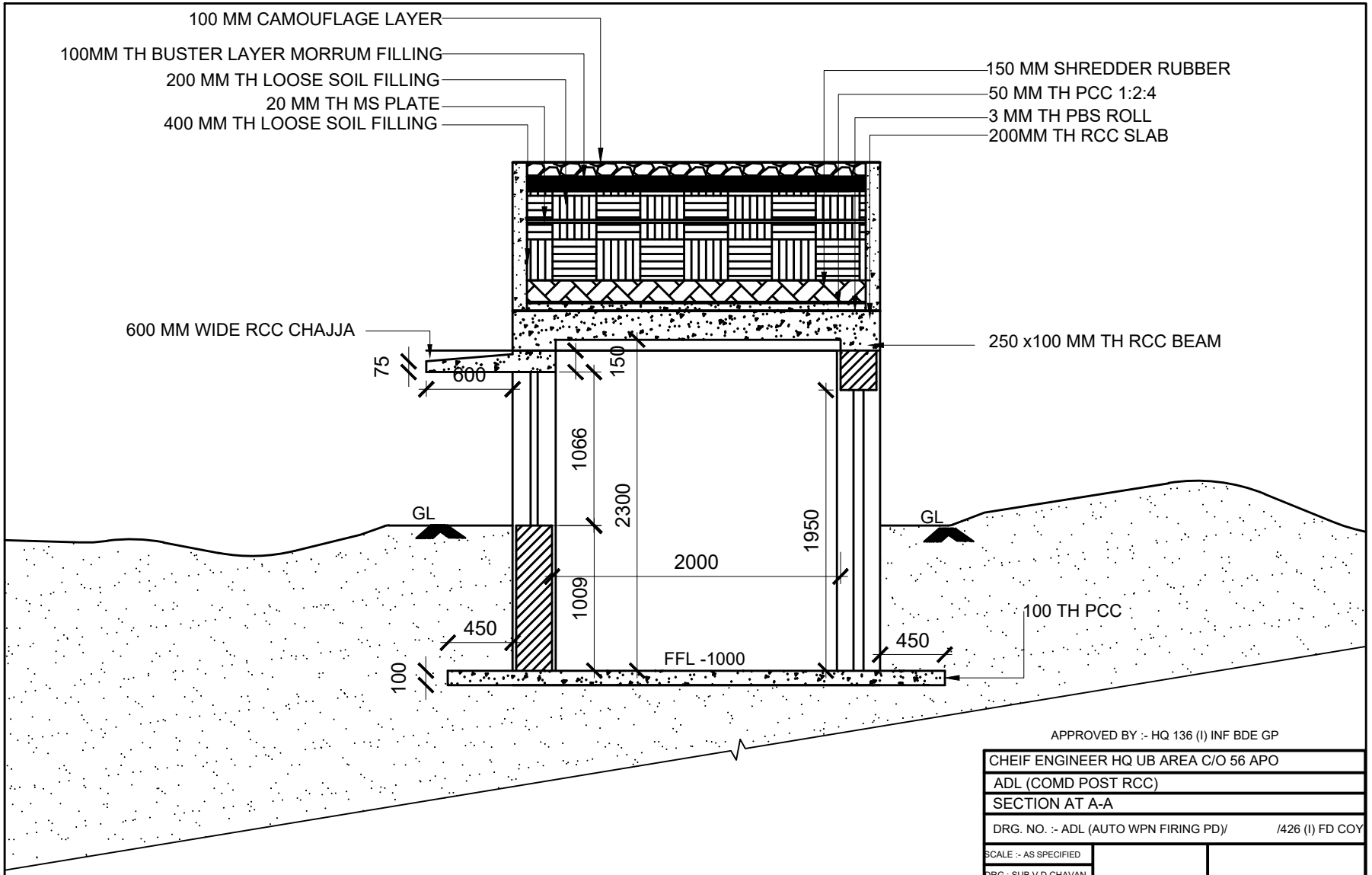
PLAN



SECTION AT A-A'

APPROVED BY :- HQ UB AREA

CHIEF ENGINEER HQ UB AREA C/O 56 APO	
DOOR FOR PD/CP	
SECTION	
DRG. NO. :-	/426 (I) FD COY
SCALE :- AS SPECIFIED	JOB NO
DATE :-	
SHEET NO.	

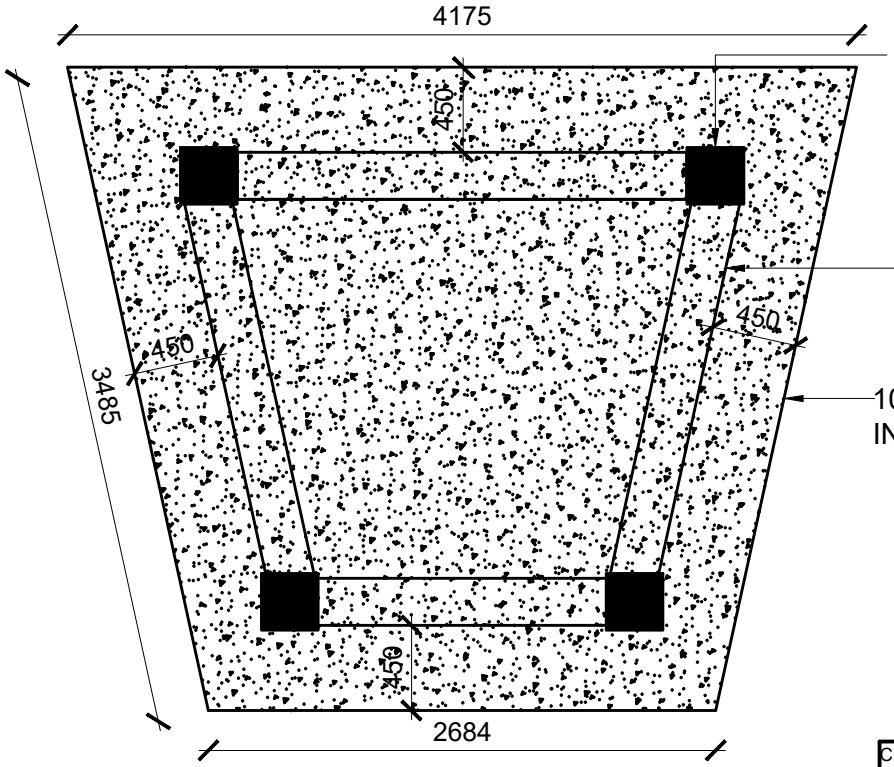


SECTION AT A -A

SCALE :- 1:50

APPROVED BY :- HQ 136 (I) INF BDE GP

CHEIF ENGINEER HQ UB AREA C/O 56 APO		
ADL (COMD POST RCC)		
SECTION AT A-A		
DRG. NO. :- ADL (AUTO WPN FIRING PD)/ /426 (I) FD COY		
SCALE :- AS SPECIFIED	JOB NO.	
DRG : SUB V D CHAVAN		
DATE :- APR 2026		
SHEET NO. 3/2		

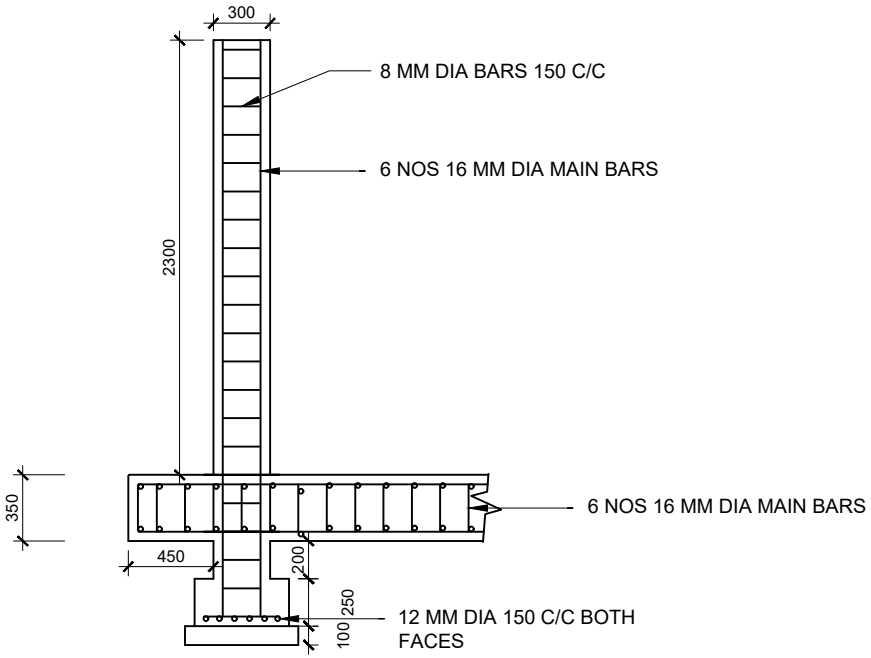


FOUNDATION PLAN : AUTOMATIC WEAPON FIRING PD

SCALE :- 1:50

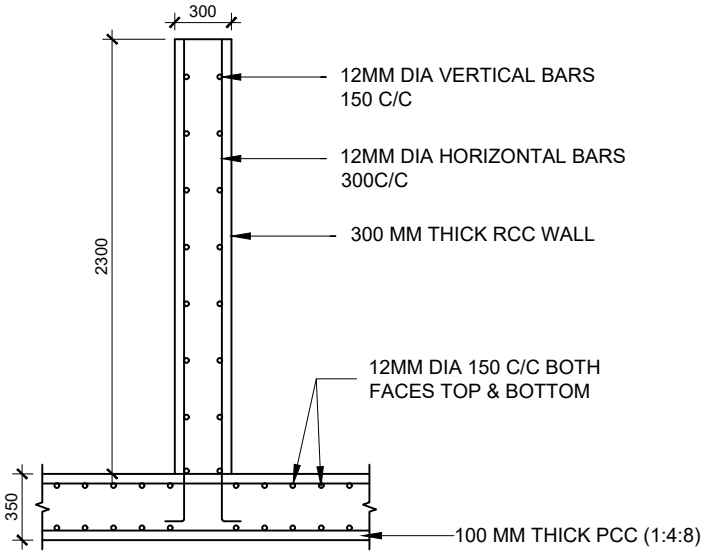
APPROVED BY :- HQ 136 (I) INF BDE GP

CHEIF ENGINEER HQ UB AREA C/O 56 APO		
ADL (COMD POST RCC)		
FOUNDATION PLAN		
DRG. NO. :- ADL (AUTO WPN FIRING PD)/ /426 (I) FD COY		
SCALE :- AS SPECIFIED	JOB NO.	
DRG : SUB V D CHAVAN		
DATE :- APR 2026		
SHEET NO. 2/2		



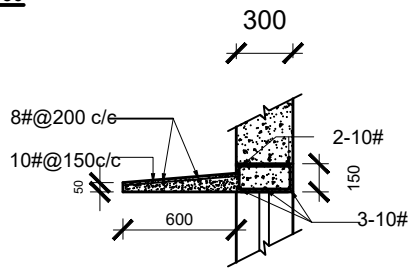
COLUMN FOUNDATION

SCALE :- 1:50



COLUMN FOUNDATION

SCALE :- 1:50

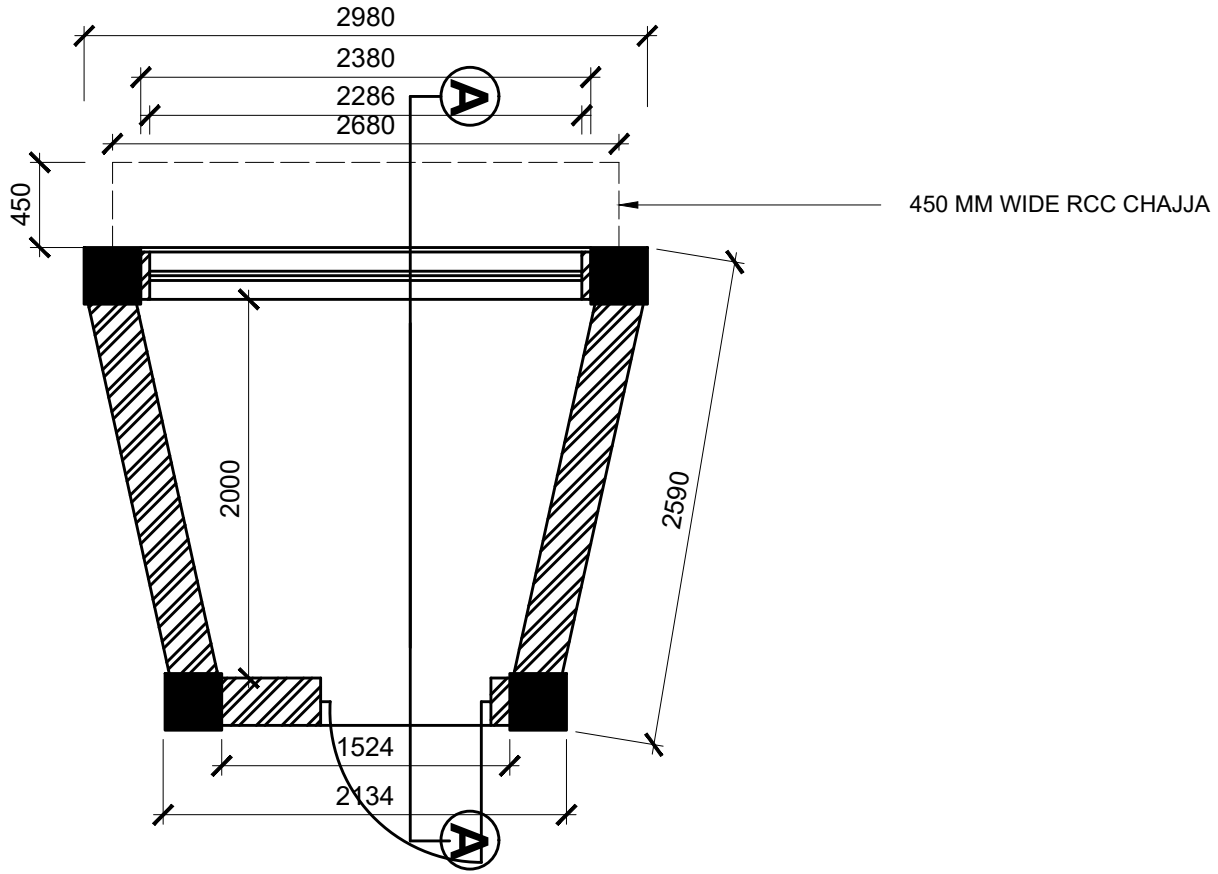


CHAJJA DETAILS

SCALE :- 1:50

APPROVED BY :- HQ 136 (I) INF BDE GP

CHEIF ENGINEER HQ UB AREA C/O 56 APO		
ADL (AUTO WPN FIRING PD)		
STRUCTURAL DETAILS		
DRG. NO. :- ADL (AUTO WPN FIRING PD)/ /426 (I) FD COY		
SCALE :- AS SPECIFIED	JOB NO.	
DATE :- APR 2026		
SHEET NO. 4/4		



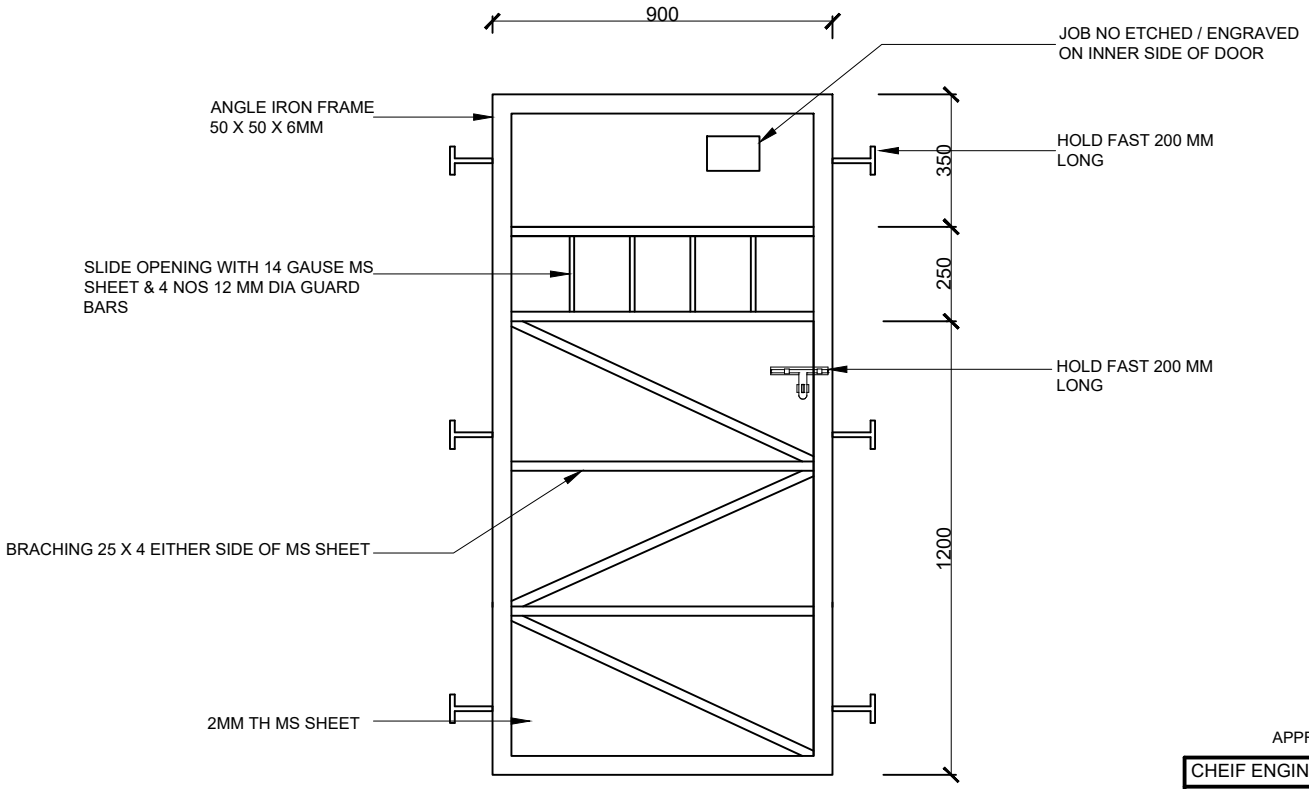
PLAN : AUTOMATIC WEAPON FIRING PD

SCALE :- 1:50

APPROVED BY :- HQ 136 (I) INF BDE GP

CHEIF ENGINEER HQ UB AREA C/O 56 APO		
ADL (COMD POST RCC)		
PLAN		
DRG. NO. :- ADL (AUTO WPN FIRING PD)/ /426 (I) FD COY		
SCALE :- AS SPECIFIED	JOB NO.	
DRG : SUB V D CHAVAN		
DATE :- APR 2026		
SHEET NO. 1/2		

NOTE :-
All dimension are in mm



APPROVED BY :- HQ UB AREA

CHEIF ENGINEER HQ UB AREA C/O 56 APO		
ADL (AUTO WPN FIRING PD)		
STEEL DOOR 900MM X 1800 MM		
DRG. NO. :- ADL (AUTO WPN FIRING PD) / /426 (I) FD COY		
SCALE :- AS SPECIFIED	JOB NO.	
DATE :-		
SHEET NO.		