KINGDOM OF CAMBODIA

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ELECTRICITE DU CAMBODGE

TECHNICAL SPECIFICATION

EDC-DTS-MV013

CONCRETE POLES

November 2021

ELECTRICITE DU CAMBODGE

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Content

Concrete poles

1 Scope

This specification covers the design, manufacturing, testing, supply, delivery and performance requirements of pre-stressed or reinforced concrete poles to be used in distribution Overhead lines of Cambodia.

The specification covers concrete poles for the following:

a) MV and LV Overhead Lines

b) Pole Mounted Substations

c) Line Switchgears and Equipment

The poles shall be pre-stressed or reinforced concrete of circular, square or rectangular cross-section with two sets of holes at 90 degrees.

The poles shall be made with the best materials available. The surface should be smooth, hard, uniform in colour and appearance and free from any air pockets exceeding 4 mm.

Before transportation, they should stay at least 28 days in the factory.

The longitudinal strength should be at least 25% of the transverse strength. The safety factor to the ultimate strength is 2.5 when the pole is subjected simultaneously to the design load and wind pressure. The design top load is applied 305 mm from the top of the pole. The minimum concrete cover from the reinforcing/pre-stressed steel is 20 mm.

Pole shall be type tested before the first mass production.

Strength (proof tests) shall be examined before delivery. The pole shall have no crack after 125% of the design load is applied. Earthing conductor shall be inside the pole if requested.

2 Standards

UN European standards

EN 12843:	Precast Concrete Products – Masts and Poles
EN 13369	Common rules for precast concrete products
EN 1990:	Eurocode 0: Basis of Structural Design
EN 1991:	Eurocode 1: Actions on Structures
EN 1992-1-1:	Eurocode 2: Design of Concrete Structures
EN 206-1:	Concrete, Part-1: Provision, Characteristics, Production and Conformity
EN 12350:	Testing Fresh Concrete
EN 12390:	Testing Hardened Concrete
EN 196:	Methods of Testing Cement
EN 197:	Cement

EN 10138-3: Pre stressing Steels, Part-3: Strand

EN 10080: Steel for the Reinforcement of Concrete – Weld Able Reinforcing Steel: General

EN 12620: Aggregates for Concrete

EN 933: Testing for Geometrical Properties of Aggregates

EN 934: Admixtures for Concrete, Mortar and Grout

EN 1008: Mixing Water for Concrete

ISO: International Standard Organisation

ISO 15630: Steels for Reinforcement and Pre-stressing of Concrete

ISO 17760: Welding – Welding of Reinforcing Steel

Unless if standard year is specified, the latest version of the above standards apply.

The Supplier may propose alternative standards, provided it is demonstrated that they give an equivalent degree of quality as the referenced standard. Acceptability of any alternative standard is at the discretion of the Purchaser.

3 Testing and inspection

3.1 General Notes for Test

The poles will be inspected at the manufacturer's plant by the Employer's Representative. Both, type and proof tests shall be performed in accordance with this specification and with the relevant standards.

It shall be of the responsibility of the manufacturer to perform all the tests specified.

Copies of previous test reports issued by the National Testing/ Standards Authority of the country of manufacture or its accredited testing laboratory shall be submitted with the tender for the purpose of technical evaluation, all in the English Language.

After manufacture, Sampling, Inspection and Methods of Test shall be in accordance with this specification. The tests shall be done at the manufacturer's works in the presence of the Employer representative.

Complete test reports for the poles shall be submitted to EDC for approval before delivery.

On receipt of the poles, EDC shall inspect the poles for integrity and physical dimensions. The manufacturer shall replace without charge, any poles which upon examination fail to meet any of the requirements in the specification.

Each class of pole shall be subjected to three kind of tests as follows:

3.1.1 Type Tests (Destructive Tests)

These shall be carried out to prove that one pole of each class of pole satisfies all the design requirements set out in this specification.

In any case, the type tests shall not be carried out before the concrete has attained its minimum 28 day cylinder compression strength even if poles are steam cured.

3.1.2 Proof Tests (Acceptance Tests)

During the contract execution, these tests shall be carried out before each pole delivery to check the consistency and continuing quality of the standard of manufacture. Neither Type nor proof testing shall be carried out on any pole:

- Until the concrete has attained its minimum 28 day cylinder compression strength.
- Before 21 days after manufacture.

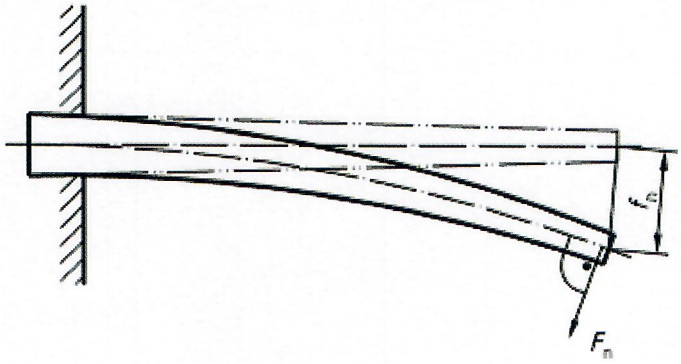
3.1.3 Routine Tests

Routine tests shall be done on each pole and shall consist of:

- All dimension checks.
- Weight checks.
- Visual checks (signs of cracks and chips, quality of surface finish, longitudinal alignment, insufficient cover over reinforcement, treatment of stressing wires at ends of poles, etc).

3.2 Testing arrangement

Poles shall be tested in the horizontal position in a testing frame. The testing arrangement shall be provided with sufficient supports to ensure that bending moments developed by the self-weight of the pole are minimal. These supports shall be detailed to give no horizontal resistance to the applied test load. The accuracy of all load and deflection measuring equipment shall be ± 2 percent and with a certificate of calibration. Note -To eliminate the effects of movement of the reaction blocks at ground level and the butt of the pole, the zero position of the deflections measuring ruler at the top of the pole must be corrected before each deflection reading. This correction can be made each time by projecting the line between centre marks at the butt and ground level reaction posts.



The design top load is applied 305 mm from the top of the pole

3.3 Observation of testing

The Contractor shall give EDC a minimum of two weeks' notice before any testing commences so that the EDC Representative can observe the tests. All testing shall be carried out by the Contractor.

3.4 Cost of testing

The cost of all pole testing shall be included in the pole cost in the Bid Price. This shall include any additional testing instructed to be carried out by EDC to prove that a class of pole satisfies all design requirements.

3.5 Type tests

These shall be carried out before full scale manufacture of a class of pole commences, after any changes are made to the approved design of a class of pole, or at any time EDC Representative considers necessary to confirm that any class of pole still satisfies the design requirements. A sample consisting of three of each pole class for each loading shall be subjected to the Type Test. The test results shall comply with the acceptance criteria at the end of this Section.

Type tests shall be carried out in 3 stages:

3.5.1 1st Stage

Measurement and checking of all dimensions and weight:

- Length
- Top diameter or dimensions
- Base diameter or dimensions
- Gravity point diameter
- Thickness of concrete at the base (round spun poles)
- Weight
- Holes distances, number and diameter
- Surface of concrete

Origin and quality of materials:

- Steel and wires
- Cement
- Aggregates (sand and gravel)
- Cube or cylinder concrete and concrete compression tests

This shall be recorded.

3.5.2 2nd Stage

After installation on the testing frame, the load shall be gradually, uniformly and without chock applied in increments of 10% of the ultimate design load up to 125% of the design working load. At each increment of load the deflection of the pole top shall be measured and recorded. Deflections shall be graphed against the applied load and the graph shall indicate a consistent relationship between load and deflection. When measuring deflection at the top of the pole, allowance shall be made for any strain movement in the reaction posts of the testing arrangement.

The loads at which any cracks become visible shall also be recorded as well as their location and their extent. A volatile liquid such as methylated spirits (methyl alcohol) shall be applied to the concrete surface so that cracks may be readily observed at all load increments.

The 125% loading shall be maintained for 5 minutes, and the pole shall be inspected for any cracks. The load shall then be gradually reduced to zero and the amount of permanent deflection of the pole top recorded.

3.5.3 3rd Stage

The test load shall be gradually reapplied up to the design working load and the deflection recorded. The load shall then be increased in 10% increments until failure occurs. At each load increment the load and deflection shall be recorded.

3.5.4 Recording and type test report

The following particulars shall be recorded for type test:

- Manufacturer's name and plant location.
- Pole classification and type.
- All dimensions of the pole.
- Date manufactured.
- Date tested.
- Concrete compression strength at the time of testing (cubes or cylinders).
- Increments of load.
- Deflections at each increment of load -for both Stage 2 and Stage 3 loads.
- Permanent deflection after removal of 2nd stage loading.
- Location of all cracking on a plan and elevation drawing of the pole, and the loads when cracking occurred.
- Load at failure.
- Nature of failure.

Colour photographs along the axis of the pole at design working and design ultimate loads, plus photographs of the failure zone on the pole.

3.5.5 Acceptance of Type test

A sample of three poles for each pole class shall be considered acceptable if:

- No visible cracking occurs up to 125% of the design working load in any of the 3 poles tested.
- Permanent deflection of the top of each pole, after the 1st stage test loading is removed, does not exceed 1 mm per meter of pole length.
- The failure strength of the three tested poles exceeds the specified breaking design strength,

The Contractor shall keep records of all Type Tests, and provide three copies to EDC representative. Type test reports shall be signed by both parties.

3.6 Proof test

Before delivery, these tests shall be carried out on poles selected at random by EDC for each delivery. The number of poles to be tested for each class shall be decided by EDC according the number of pole supplied but will be at least one for each pole class and never exceed 1% of each class of pole.

All measurement shall be done as mentioned in the 1st stage of type tests and recorded

Then, test loadings shall be applied with increments of 20% similarly than Type Test 2nd stage

The poles will be considered acceptable if:

- The dimensions and weight are similar to those of the type test record. A special attention shall be drawn on weight, diameters and concrete thickness at the base of the pole for centrifuged concrete poles as well as for the concrete compression strength. For those measurements, a deviation exceeding ± 5 % on only one pole selected at random for proof tests will result in the rejection of the complete pole batch/delivery.
- The deflection at each load increment and the permanent deflection upon removal of load does not exceed by more than 15% the average of the corresponding values for 1st stage loading of the Type Tests. If this value exceeds 15% for only one tested pole, the full pole batch/delivery will be rejected. In addition, there is no visible concrete crack at 125% loading maintained for 5 minutes.

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The Contractor shall keep records of all Proof Testing, and provide three copies to EDC Representative. Proof test reports shall be signed by both parties.

4 Quality Management

Design, development and production of the proposed equipment shall be ISO 9001 certified. The ISO 9001 certificate shall be submitted within the bid.

In case the design, development and production of poles are not ISO 9001 certified, the manufacturer processes and design/production workshops shall mandatorily implement a quality process satisfactory to EDC and/or Local Authorities with the target to obtain ISO certification in a near future.

5 Ambient conditions

The concrete poles shall be suitable to operate in the ambient conditions described here after:

Altitude	Sea level to 1,000 meters
Climate	Tropical
Annual Rainfall	1,300 mm.140 days
Monsoon Period	June to November
Ambient Air Temperatures:	
Average	27.5°C
Minimum	13.3°C
Maximum	40.5°C
Relative Air Humidity	65-100%
Solar Emissivity	0.8
Solar absorption	0.8
Wind Velocity:	
Average	37 km/h (10.3 m/s)
Maximum	72 km/h (20 m/s)

6 Technical Requirements

6.1 Design, material and fabrication

The concrete poles shall be round, square or rectangular and of Pre-stressed or Reinforced Concrete technology. Round poles shall be concrete centrifuged pole (spun).

Structural design of the concrete poles shall be of the responsibility of the manufacturer according to the data submitted by EDC.

6.1.1 Materials

The materials used shall be new and in conformity with the design standard. They shall be selected to suit intended application.

6.1.1.1 Aggregates

The aggregates used shall be free from veins and adherent coating and free from injurious amount of disintegrated pieces, alkali, vegetable matter and other deleterious substances. As far as possible, flaky, sconaceous and elongated pieces shall be avoided.

Prohibited aggregate:

- Coming from feldspathic or schistous rock
- Containing charcoals or their residues such as coke, ashes, clinkers, flints

Alkali reactive aggregates shall not be used.

6.1.1.2 Cement

Deteriorated cement shall not be used. The cement shall conform to the standard of the Ordinary Portland Cement specified in EN 197 or equivalent.

Mixing water shall be uncontaminated (i.e., free of oils, organic matters, etc.) and free of substances in amounts that may be harmful to concrete or reinforcement. It shall not contain more than 600 mg chloride (Cl-) per litter and shall be from normal drinking water supply or be of equivalent quality.

6.1.1.3 Admixtures

Admixtures in concrete are authorized provided they does not include chlorides. Admixtures can be of plasticiser or curing accelerators type provided they are not harmful to the concrete ageing.

6.1.1.4 Reinforcement bars

Steel reinforcement bars or wire shall be mild steel as per EN 10080. Other higher strength reinforcement may be used in concrete poles if the manufacturer proves by extensive test evidence the satisfactory ductility and anchorage performance of the reinforcement.

Copies of steel reinforcement bars manufacturers test certificates for the bars showing quality and characteristics of steel shall be made available by the pole manufacturer on EDC request.

As being responsible of the pole structure design, the manufacturer will choose the kind and diameter of steel bars used for steel reinforcement. Nevertheless, EDC shall be informed about the manufacturer choice.

All reinforcement bar shall be free from loose scale, oil, grease, clay or other material that may have deleterious effect on the bond between the reinforcement and concrete.

As being responsible of the pole design, the manufacturer will choose the strength of mild steel used for reinforcement bars. Nevertheless, EDC shall be informed about this strength.

6.1.1.5 Pre-stressed steel wires/strands

Pre-stressed steel wires/strands shall be conformed to the requirement of EN 10138-3 and ISO 15630 or equivalent.

Hard-drawn high-tensile steel wire which has not been stress-relieved shall be permitted only for wire winding, unless its percentage elongation is 2% or greater.

19-wire steel strand shall not be used for pre-tensioned work (pre-stressed pole).

As being responsible of the pole structure design, the manufacturer will choose the strength of high-tensile steel used for pre-stressed wire/strands/bars. Nevertheless, EDC shall be informed about the manufacturer choice.

Copies of steel manufacturers test certificates for the tendons showing breaking and proof strength, together with a stress strain diagram shall be made available by the manufacturer on EDC request. Each coil of strand shall carry a label showing the batch identification, serial number or other mark to identify it with the test certificates.

6.1.1.6 Spacing of bars

Space between individual bars and/or external parts of bundles of reinforcing steel shall be:

- with respect to casting : the maximum aggregate size and ;
- with respect to anchoring and bonding :
  - a minimum spacing equal to 2/3 of the relevant equivalent diameter of reinforcing steel (for reinforced steel poles) ;
  - a minimum spacing equal to the nominal diameter of tendons with a minimum of 8 mm spacing (for pre-stressed steel poles).

The above rules do not apply to splices.

6.1.1.6.1 Transverse reinforcement

A/ Square or rectangular reinforced concrete poles

Transverse reinforcements are designed according to transverse loads defined either by the manufacturer declaration or by a specific order. The maximum pitch of spirals or spacing of links shall result either from the design or from experience according to the state of the art. In particular, when load bearing capacity of the pole is verified by type testing, the maximum distance between two transverse reinforcements shall be defined according to the results, with a maximum of 1.50 m.

B/ Square or rectangular pre-stressed concrete poles

Where verified by type tests and justified by experience, transverse reinforcement is not necessary.

C/ Reinforced or pre-stressed spun concrete poles

The minimum transverse reinforcement ratio shall be:

- for pole diameters at the foot greater than or equal to 800 mm, 0,15 % of the longitudinal concrete section
- for pole diameters at the foot less than or equal to 400 mm, 0,05 % of the longitudinal concrete section
- for pole diameters at the foot less than 800 mm and greater than 400 mm by linear interpolation between the above mentioned values.

6.1.2 Option Base reinforcement of pre-stressed poles against chock

As option, round and rectangular/square Pre-stressed poles shall integrates steel reinforcement bars at the base of the pole from 750 mm maximum (1000 mm for 14 m length poles) from the pole butt and on a minimum length of 3.75 meter (4 m for 14 m length poles) from the butt of the pole. These reinforcement bars located all around the pole shall be enough in diameter and strength to reinforce the pre-stressed pole withstand against big chocks as cars accidents.

6.1.3 Option Earthing

Where requested as option for T and A, an internal earth connection with appropriate hot dip (or threaded bronze) galvanized terminals may be incorporated into the pole: One terminal about 20 cm from the top of the pole and one at 20 cm above the ground reference line mark.

Reinforcement steel bars may be used as an earth conductor for steel reinforced poles.

For pre stressed concrete pole, a specific 35 mm² copper conductor must be added inside the pole. This conductor shall be protected against any concrete corrosive aggression.

In any case the steel pre stressed bars or wire shall not be used for earthing.

6.2 Storage and Protection of Materials

Cement shall be stored in a suitable weatherproof enclosure on a board platform raised of the ground.

The enclosure should be such that free circulation of air around the bags of cement is kept to a minimum.

Any cement that has become damp, caked or lumpy shall not be used. Concrete batching operations shall be organized so that cement that has be longest at the place of the manufacture of the poles is used first.

Both fine and coarse aggregates shall be stored so that they kept clean and free from contamination.

The bottom 150 mm of the aggregate piles which are in contact with the ground shall not be used.

Aggregates shall be stored on site for at least 24 hours before use, to permit the draining away of any excess moisture in the aggregates.

All reinforcing steel or wire/strand shall be stored in a clean dry place on platforms off the ground. Grease, oil, paint or any other substance that will affect the bond of the reinforcement/pre-stressing shall not be allowed to come in contact with it. If it does then all such substances shall be removed and the steel cleaned before it is placed in the pole moulds.

All pre-stressing tendons shall be stored in a clean dry place off the ground and must be kept dry at all times.

All loose surface rust and any protective oil or other contaminations that will affect the bond of the tendons shall be thoroughly removed before installing them in the pole moulds.

Any part of the tendons that have become pitted, have any tears or nicks, or are permanently deformed or otherwise damaged shall be discarded.

6.2.1 Concrete

The concrete shall be mixed in power driven mixers and the concrete making materials shall be accurately measured to ensure the production of uniform batches of concrete. The manufacturer shall keep, at the mixing site, records showing for each batch of concrete produced, the time and date of water addition, the weight of cement, weight of each grade of aggregate, weight of added water, results of tests made to determine the water contained in the aggregate, the results of any strength tests and the location of concrete in the works. These records shall be made available to EDC.

Personnel in charge of concrete mixing operations shall be experienced and well versed in this method of concrete production.

Concrete shall be conveyed from the mixer to moulds by a method that prevents segregation or loss of the ingredients. It shall be placed as nearly as practicable in its final position to avoid segregation due to re-handling or flowing.

The concrete shall be consolidated in the moulds using high frequency internal or external vibrators or centrifugation or other efficient means. Hand compaction shall not be permitted.

The amount of vibration shall be uniform along the length of the mould and shall be carefully controlled so that adequate consolidation of the concrete is achieved without causing segregation of the mix ingredients by over-vibration. Particular attention should be given to achieving adequate consolidation at the ends of the pre-stressed concrete poles to improve the bond between pre-stressing tendons and concrete.

Centrifugation of spun concrete pole shall be carried smoothly without any chock.

During the initial stages of hardening, the concrete shall be protected from the direct rays of the sun and from dry winds. The moulds containing that hardening concrete shall not be disturbed or shifted unless it can be shown that such movement will not impair any damaging stress to the hardening concrete.

Concrete shall be cured in an environment that ensures that it remains saturated or nearly saturated during the curing period.

6.2.2 Pole Moulds and Surface Finishes.

Moulds shall be designed, constructed and finished to ensure they can be removed without damaging the hardened concrete and they shall be securely braced and supported to prevent sagging and bulging during the deposition of the concrete. Joints in the materials used to manufacture the moulds shall be tight and shall not permit any leakage of cement paste from the concrete mix.

Moulds which are required to withstand any pre-stressing forces shall be constructed of steel and be sufficiently rigid to carry these forces without distortion.

The finished pole shall have a smooth outer surface with neat lines, uncoloured without excessive air bubbles, blemishes spots or honeycombing and free of cracks.

Surfaces shall be as taken from the moulds without excessive working. The pole then shall be trowelled smooth to remove all projections, depressions and irregularities.

The ends plastering of pole top and butt shall be done with the best workmanship. The plastering shall be properly done and the mortar used shall adhere firmly to the pole concrete. For this purpose mortar additive may be used.

For all kinds of pole, the butt face shall be strictly perpendicular to the pole axle. Poles that doesn't meet this requirement shall be rejected.

6.2.3 Holes

The holes of poles for fixing pole equipment shall be done as per attached drawings. They can be made using PVC pipes or directly made in the concrete provided they are not plugged by concrete.

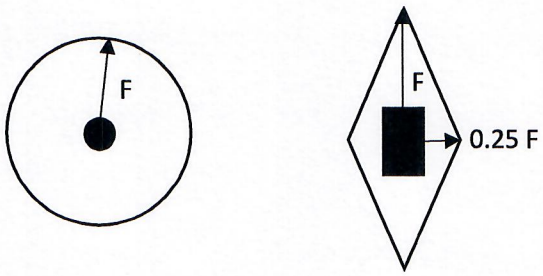
The diameter of holes shall be 18 mm.

6.3 Sizes and types

The concrete poles shall conform to the following sizes:

Total Length Meters and Strength Class	Design Load Applied 305 mm Below Pole Top (kN)	Minimum breaking load (kN) with safety factor K=2.5
9m, Type S (2kN)	2	> 5
9m, Type A (5kN)	5	> 12.5
9m, Type T (8kN)	8	> 20
12m, Type S (3kN)	3	> 7.5
12m, Type A (6kN)	6	> 15
12m, Type T (9kN)	9	> 22.5
14m, Type S (4kN)	4	> 10
14m, Type A (6.5kN)	6.5	> 16.25
14m, Type T (10kN)	10	> 25

The ultimate pole top load to be used for designing each class of pole shall be a factor of safety (F.O.S.) **k = 2.5** times the appropriate standard design working load scheduled above. Ultimate design forces to be used for the pole design shall result from this load applied to the pole when held in the standard test frame specified in the pole testing section of this specification.
The rectangular/square pole shall be so designed that its strength in a direction transverse to the nominal design load shall be equal to 25% of this nominal load, sufficient to take the load due to wind on conductors, fittings and the pole and with a minimum breaking load of 25% of the pole minimum breaking load.



6.3.1 Dimensions of top and butt

The minimum and maximum dimensions of pole top and butt shall be as follow:

6.3.1.1 Round shape poles

Total Length Meters and Strength Class	**Top diameter**		**Butt diameter**	
	Minimum (mm)	Maximum (mm)	Minimum (mm)	Maximum (mm)
9m, Type S (2kN)	160	230	260	350
9m, Type A (5kN)	160	230	260	350
9m, Type T (8kN)	160	230	260	350
12m, Type S (3kN)	190	230	350	390
12m, Type A (6kN)	190	230	350	390
12m, Type T (9kN)	190	270	350	430
14m, Type S (4kN)	190	270	377	456
14m, Type A (6.5kN)	190	270	377	456
14m, Type T (10kN)	190	270	377	456

6.3.1.2 Rectangular shape poles

Total Length Meters and Strength Class	Top l x L				Butt l x L			
	Min (mm)		Max (mm)		Min (mm)		Max (mm)	
	l	L	l	L	l	L	l	L
9m, Type S (2kN)	130	160	130	160	240	300	300	300
9m, Type A (5kN)	170	240	170	240	260	300	300	340
9m, Type T (8kN)	190	280	190	280	300	350	310	430
12m, Type S (3kN)	150	200	160	200	260	400	280	400
12m, Type A (6kN)	170	240	170	240	300	400	360	480
12m, Type T (9kN)	200	280	200	300	350	480	360	480
14m, Type S (4kN)	150	200	180	230	280	400	300	400
14m, Type A (6.5kN)	170	240	210	240	350	400	360	480
14m, Type T (10kN)	200	300	210	320	350	480	360	500

6.3.2 Tolerances

Poles shall be made to the following dimensional tolerances:

- Pole length ± 0.5%
- Pole straightness 1mm/1000mm
- Pole diameters and dimensions ± 10 mm
- Distance between holes ± 3mm
- Center-to-center distance between holes ± 3mm
- Uppermost hole from pole top ± 10mm

6.4 Marking

Each concrete pole shall be engraved permanently by impressing on the pole (or by use of a permanently secured non corrosive plate) at a position 2 m above the pole Ground line with the following details:

- EDC
- Length of pole (meters) ,
- Design Load
- Date of manufacturing (Month/year)
- Manufacturer Name
- Project name (option)

Example:

EDC
12 M
6kN
12/21
XXXX
OPTION

For Pre-stressed poles with base reinforcement option (see clause 6.6.1) the letter R shall be added after design load marking as follow:

EDC
12 M
6kN R
12/21
XXXX
OPTION

Where a plate is used, it shall be made of stainless steel or aluminum, securely affixed to the pole. In all cases the lettering shall be not less than 5mm high legibly engraved.
Marking by painting is not acceptable.

6.4.1 Ground line reference mark

The ground line reference mark shall be done by impressing concrete on all the poles:

Pole length	Ground line reference
9 m	1.5m from the butt
12 m	2m from the butt
14 m	2.3 m from the butt

6.4.2 Lifting and balance marks

In addition, The Manufacturer shall indicate the location of lifting points by the letter "L" and by a line and the letter "B" for the balance point, clearly on all poles.

6.5 Lifting and Handling

In addition to the loadings given, poles must also be designed for loads resulting from handling, transportation and erection. Poles shall be designed for two point pickup and for single point pickup.

The contractor shall indicate clearly on all poles the location of lifting and balance points. The contractor shall also state clearly any restrictions to be observed in the handling, transportation and erection process.

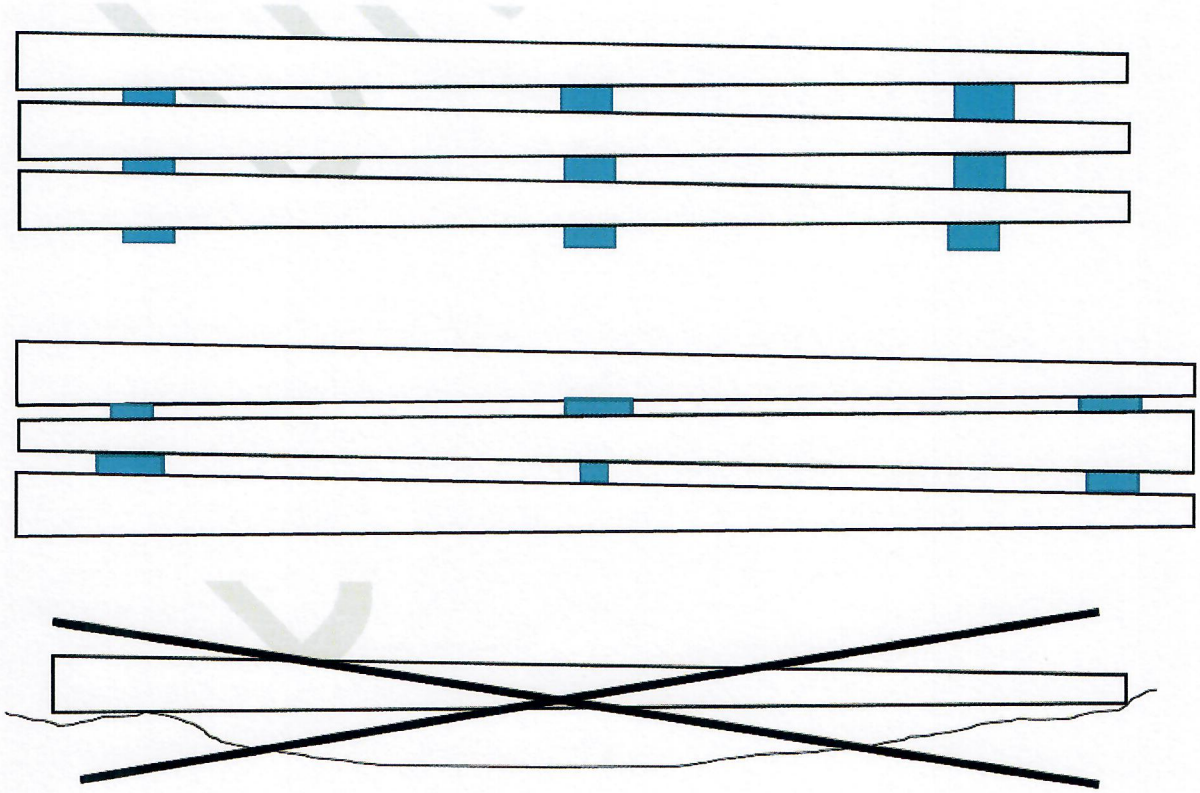
Poles shall not be lifted or handled until the concrete has attained a strength of not less than twice the stress induced by the methods of handling and lifting.
The designer shall show on the construction drawings the points at which the poles are to be lifted and supported and only these points shall be used for lifting and supporting during manufacturing and stockpiling.

Poles shall not be proof tested or-delivered before 28 days after manufacturing

6.6 Pole storage

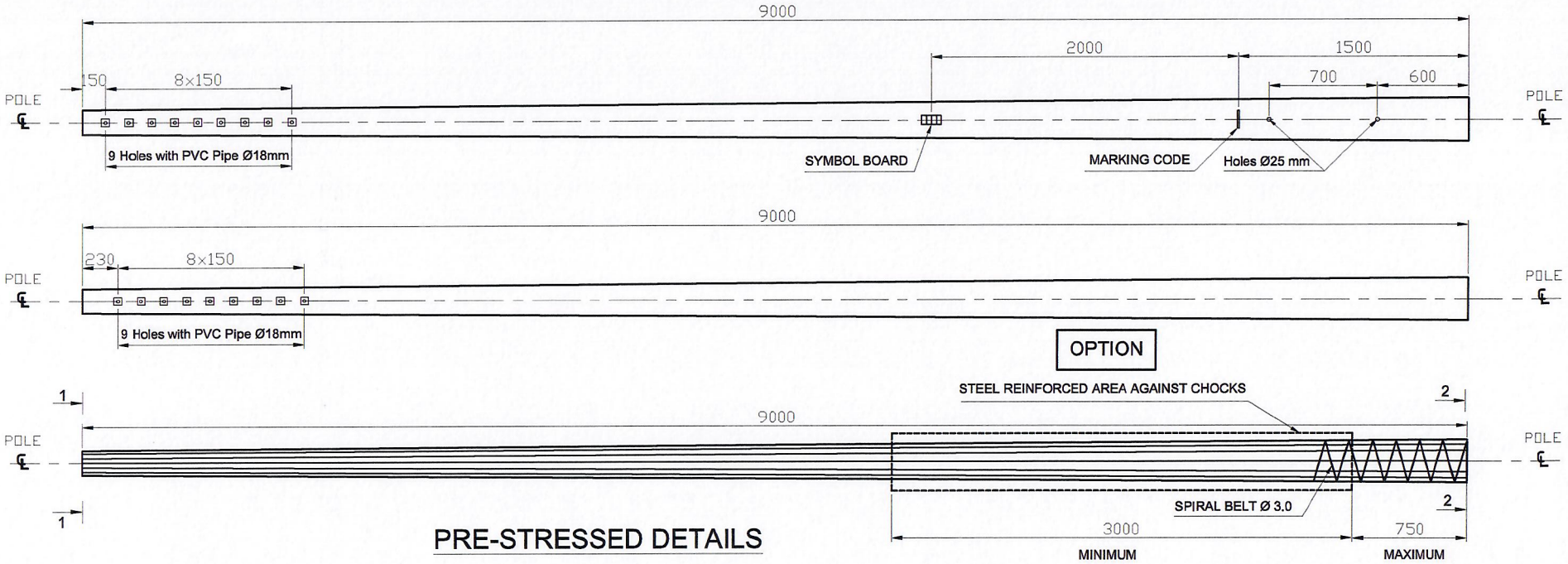
The pole storage at Factory/warehouse and work site shall be properly done in order to avoid any constraint on the poles. For this purpose, poles shall be mandatorily stored on a flat surface. In case the soil surface is not flat, it is mandatory to install at least wooden pieces on the poles length for compensating the soil height difference.
Additionally, each pole layer of the stacking shall be separated from the other pole layer by at least 3 wooden pieces taken into account the pole "taper".
The maximum pole layer shall be calculated by the manufacturer in order the poles weight does not affect the pole on the base of the storage.

The contractor (Manufacturer or Construction Company depending the case) shall be responsible of the right pole storage.

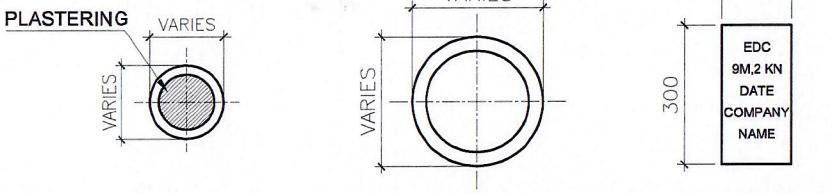


7 Drawings

The drawing here in after are for samples only because they do not take into account all manufacturer's designs.



PRE-STRESSED DETAILS



SECTION 1-1 | SECTION 2-2 | SYMBOL BOARD

NOTES:

- MATERIAL:

1. Ø18mm HOLE SHALL BE STRICTLY IDENTICAL IN DIAMETER, LOCATION AND PROTECTED BY 2mm PVC PIPES.
2. MORE HOLES CAN BE ADDED
3. REINFORCED AREA BY STEEL BARS IN ADDITION TO THE TENDONS
4. POLE MANUFACTURERS ARE RESPONSIBLE FOR THE STRUCTURAL DESIGN
5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

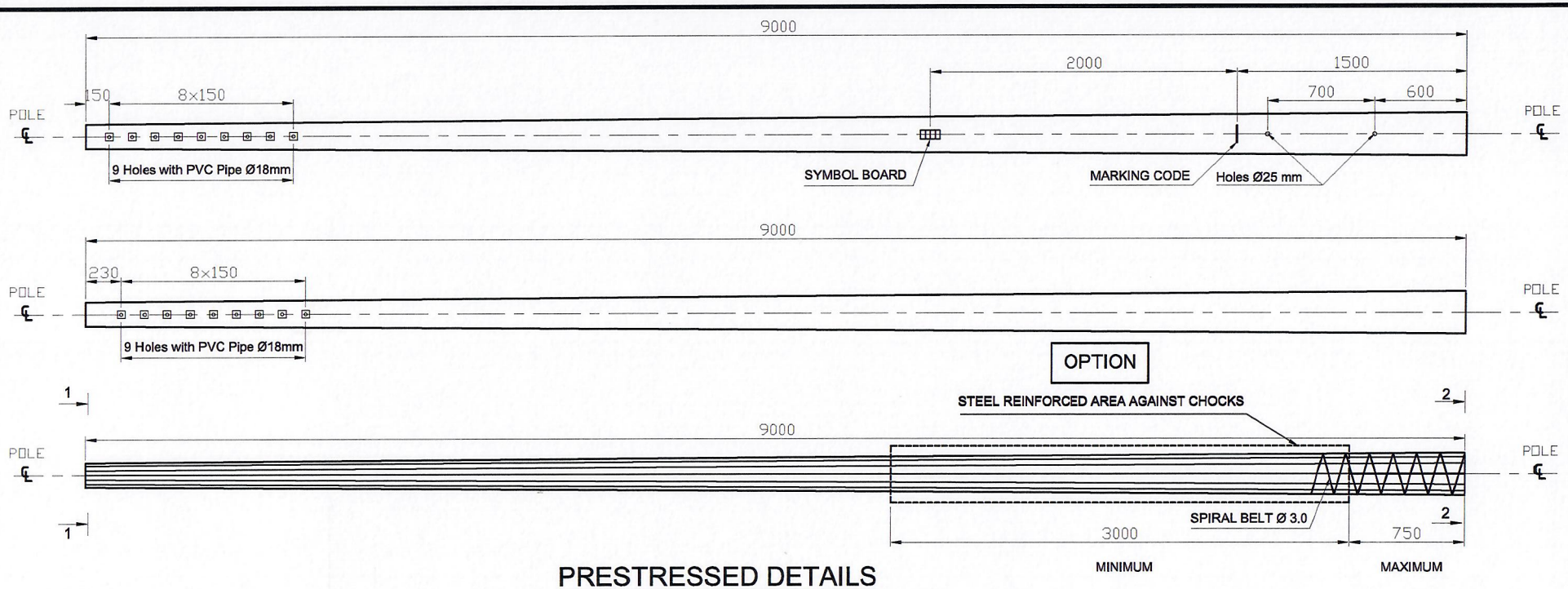
Position	Name	Signature	Date
Drawn by			
Prepared by			
Checked by			
Approved by			

9M LONG PRESTRESSED CONCRETE POLE CAPACITY **2 KN** (K = 2.5)

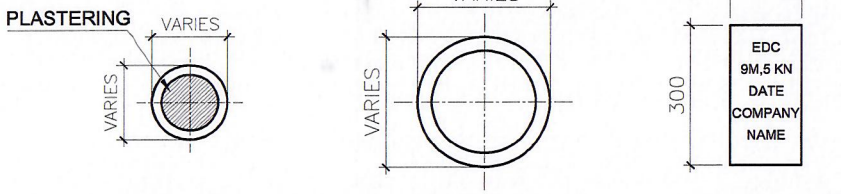
Project Name:

DWG No.	Scale
EDC02-CP-001	N.T.S

REV.01
Date :



PRESTRESSED DETAILS



SECTION 1-1 | SECTION 2-2 | SYMBOL BOARD

NOTES:

- MATERIAL:

1. Ø18mm HOLE SHALL BE STRICTLY IDENTICAL IN DIAMETER, LOCATION AND PROTECTED BY 2mm PVC PIPES.

2. MORE HOLES CAN BE ADDED

3. REINFORCED AREA BY STEEL BARS IN ADDITION TO THE TENDONS

4. POLE MANUFACTURERS ARE RESPONSIBLE FOR THE STRUCTURAL DESIGN

5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

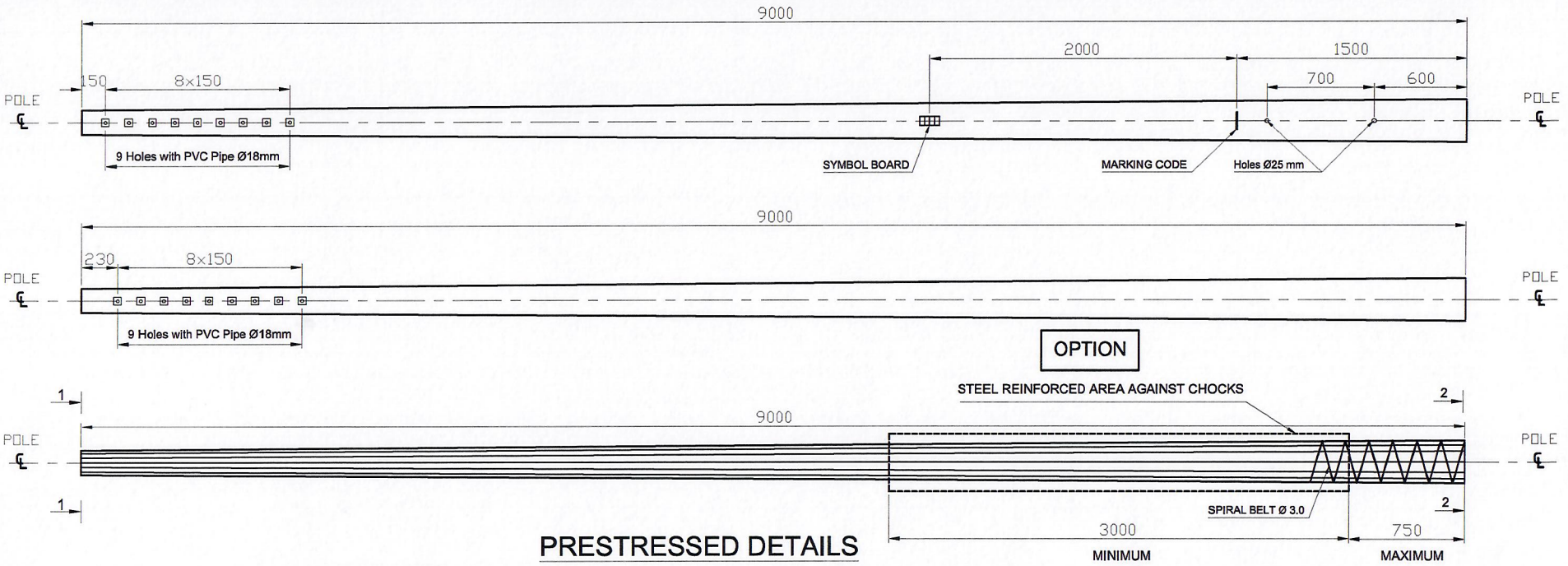
Position	Name	Signature	Date
Drawn by			
Prepared by			
Checked by			
Approved by			

9M LONG PRESTRESSED CONCRETE POLE CAPACITY **5 KN** (K = 2.5)

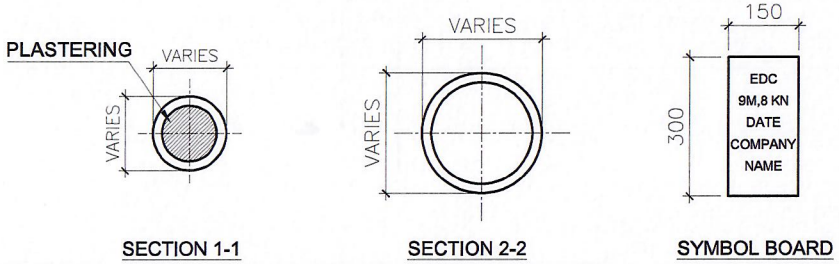
Project Name:

DWG No.	Scale
EDC02-CP-002	N.T.S

REV.01
Date :



PRESTRESSED DETAILS



NOTES:

- MATERIAL:

1. Ø18mm HOLE SHALL BE STRICTLY IDENTICAL IN DIAMETER, LOCATION AND PROTECTED BY 2mm PVC PIPES.
2. MORE HOLES CAN BE ADDED
3. REINFORCED AREA BY STEEL BARS IN ADDITION TO THE TENDONS
4. POLE MANUFACTURERS ARE RESPONSIBLE FOR THE STRUCTURAL DESIGN
5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

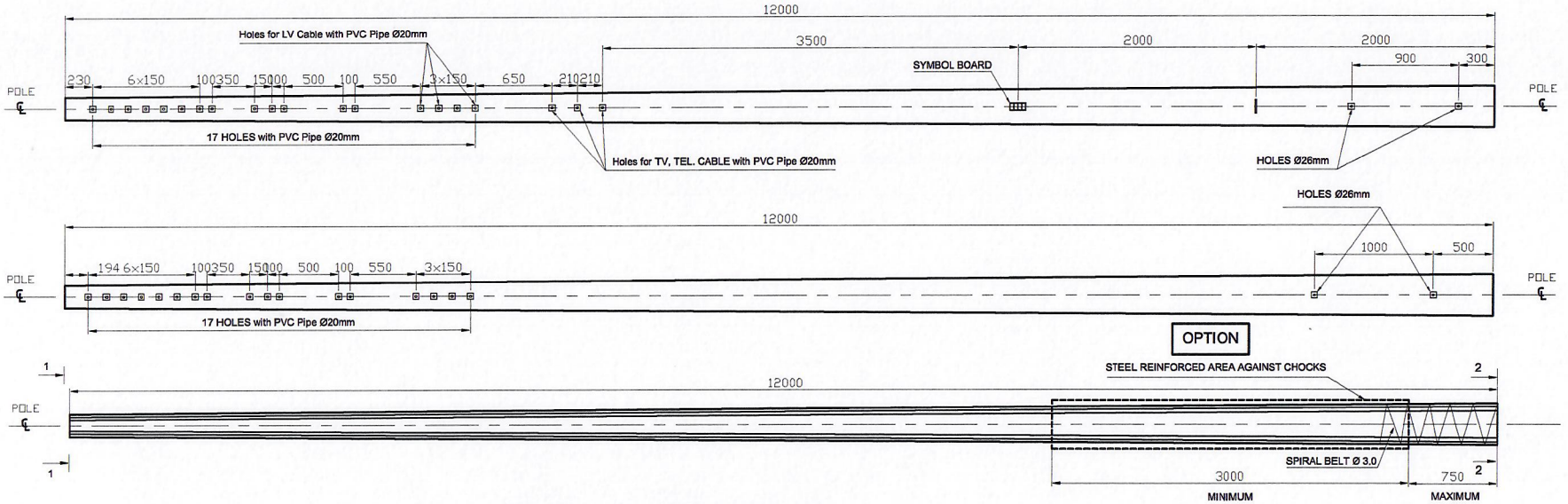
Position	Name	Signature	Date
Drawn by			
Prepared by			
Checked by			
Approved by			

9M LONG PRESTRESSED CONCRETE POLE CAPACITY **8 KN** (K = 2.5)

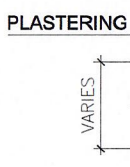
Project Name:

DWG No.	Scale
EDC02-CP-003	N.T.S

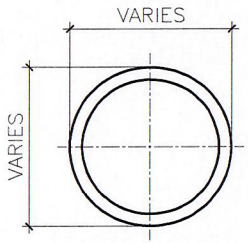
REV.01
Date :



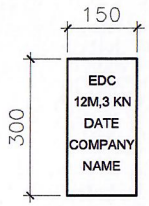
PRESTRESSED DETAILS



SECTION 1-1



SECTION 2-2



SYMBOL BOARD

NOTES:

- MATERIAL:

1. Ø18mm HOLE SHALL BE STRICTLY IDENTICAL IN DIAMETER, LOCATION AND PROTECTED BY 2mm PVC PIPES.

2. MORE HOLES CAN BE ADDED

3. REINFORCED AREA BY STEEL BARS IN ADDITION TO THE TENDONS

4. POLE MANUFACTURERS ARE RESPONSIBLE FOR THE STRUCTURAL DESIGN

5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

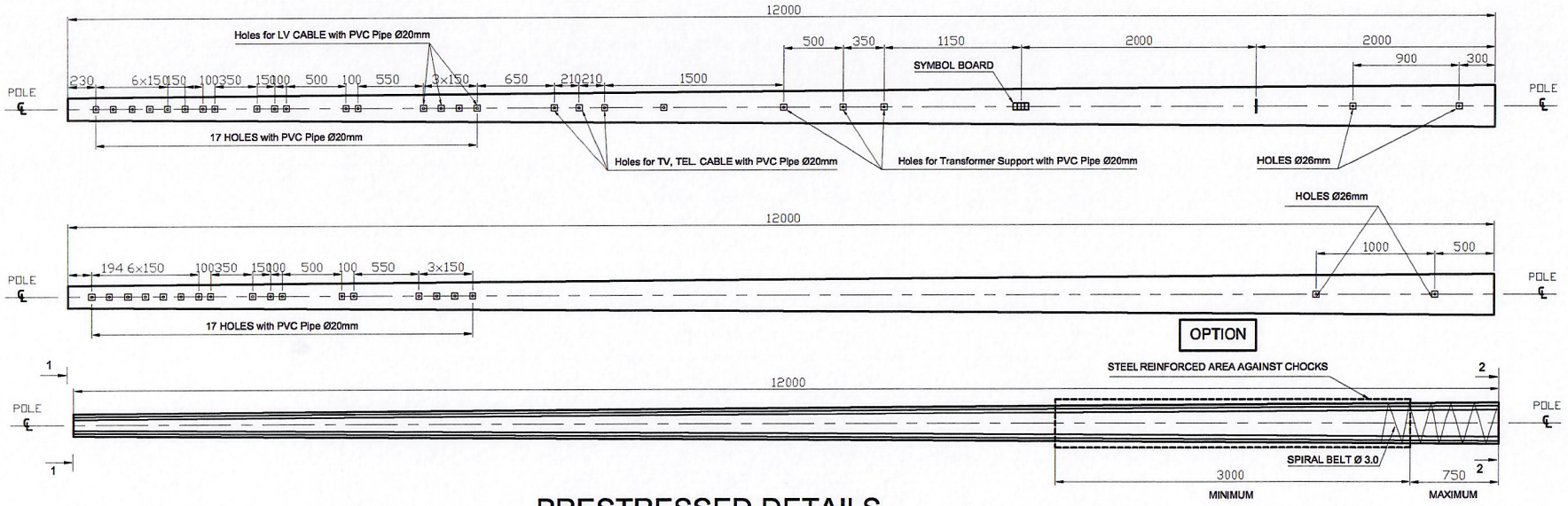
Position	Name	Signature	Date
Drawn by			
Prepared by			
Checked by			
Approved by			

12M LONG PRESTRESSED CONCRETE POLE CAPACITY **3 KN** (K = 2.5)

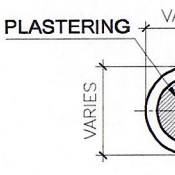
Project Name:

DWG No.	Scale
EDC02-CP-004	N.T.S

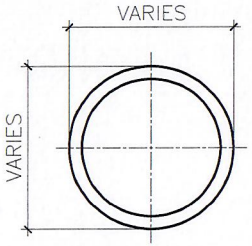
REV.01
Date :



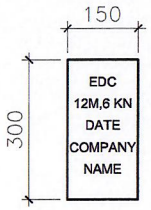
PRESTRESSED DETAILS



SECTION 1-1



SECTION 2-2



SYMBOL BOARD

NOTES:

- MATERIAL:

1. Ø18mm HOLE SHALL BE STRICTLY IDENTICAL IN DIAMETER, LOCATION AND PROTECTED BY 2mm PVC PIPES.
2. MORE HOLES CAN BE ADDED
3. REINFORCED AREA BY STEEL BARS IN ADDITION TO THE TENDONS
4. POLE MANUFACTURERS ARE RESPONSIBLE FOR THE STRUCTURAL DESIGN
5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

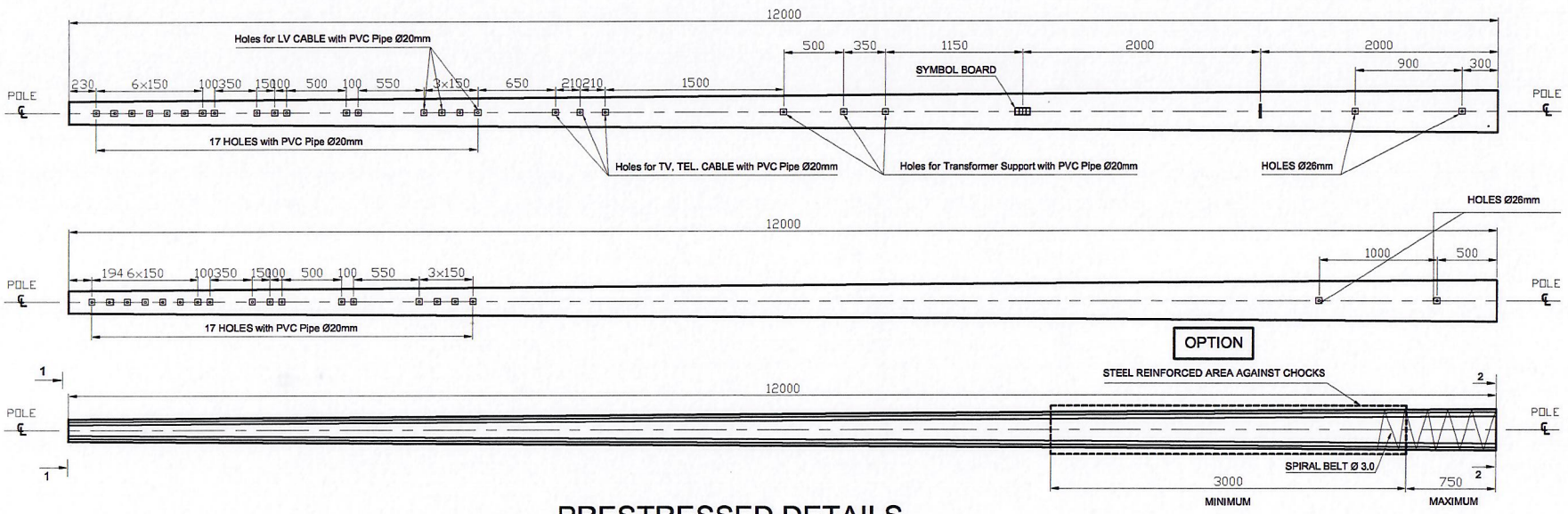
Position	Name	Signature	Date
Drawn by			
Prepared by			
Checked by			
Approved by			

12M LONG PRESTRESSED CONCRETE POLE CAPACITY **6 KN** (K = 2.5)

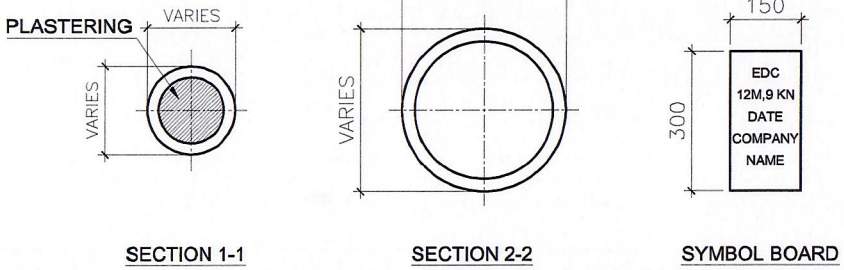
Project Name:

DWG No.	Scale
EDC02-CP-005	N.T.S

REV.01
Date :



PRESTRESSED DETAILS



SECTION 1-1 SECTION 2-2 SYMBOL BOARD

NOTES:

- MATERIAL:

1. Ø18mm HOLE SHALL BE STRICTLY IDENTICAL IN DIAMETER, LOCATION AND PROTECTED BY 2mm PVC PIPES.

2. MORE HOLES CAN BE ADDED

3. REINFORCED AREA BY STEEL BARS IN ADDITION TO THE TENDONS

4. POLE MANUFACTURERS ARE RESPONSIBLE FOR THE STRUCTURAL DESIGN

5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

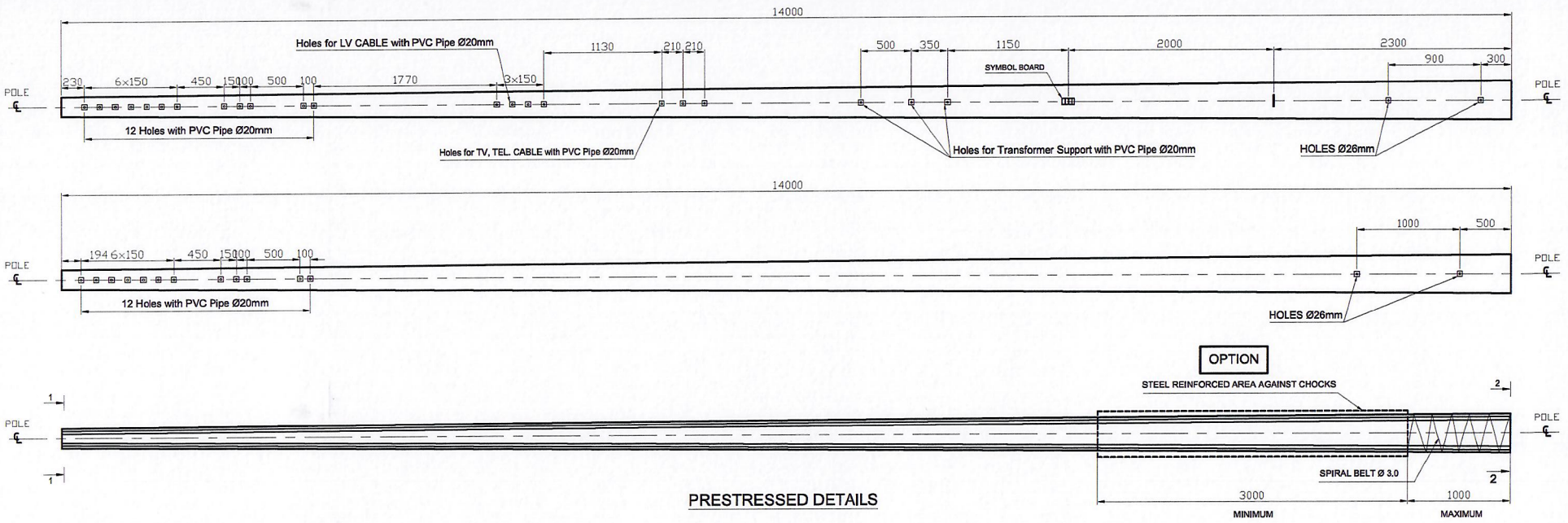
ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

Position	Name	Signature	Date
Drawn by			
Prepared by			
Checked by			
Approved by			

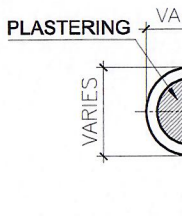
12M LONG PRESTRESSED CONCRETE POLE CAPACITY **9 KN** (K = 2.5)

Project Name:

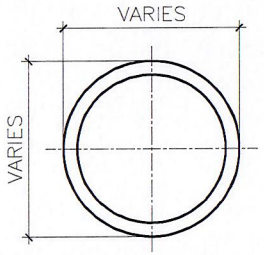
DWG No.	Scale
EDC02-CP-006	N.T.S
REV.01	
Date :	



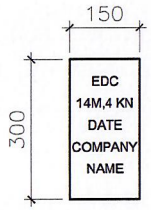
PRESTRESSED DETAILS



SECTION 1-1



SECTION 2-2



SYMBOL BOARD

NOTES:

- MATERIAL:

1. Ø18mm HOLE SHALL BE STRICTLY IDENTICAL IN DIAMETER, LOCATION AND PROTECTED BY 2mm PVC PIPES.
2. MORE HOLES CAN BE ADDED
3. REINFORCED AREA BY STEEL BARS IN ADDITION TO THE TENDONS
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5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

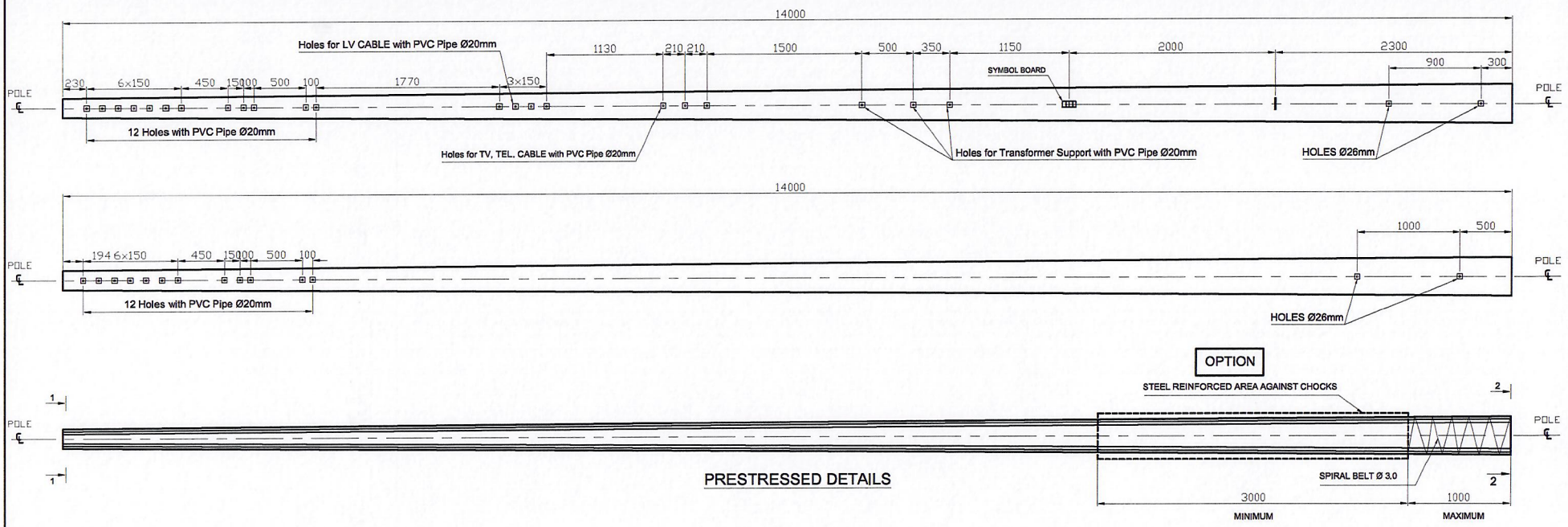
Position	Name	Signature	Date
Drawn by			
Prepared by			
Checked by			
Approved by			

14M LONG PRESTRESSED CONCRETE POLE CAPACITY **4 KN** (K = 2.5)

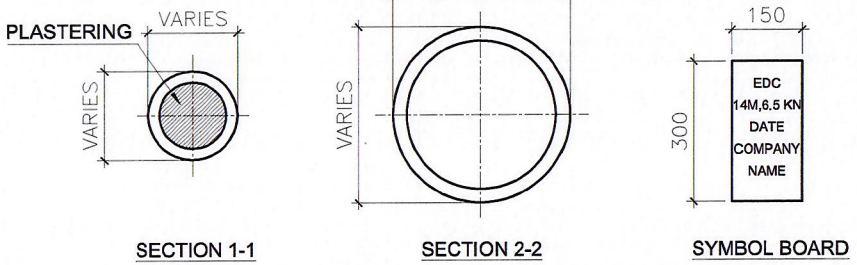
Project Name:

DWG No.	Scale
EDC02-CP-007	N.T.S

REV.01
Date :



PRESTRESSED DETAILS



SECTION 1-1 SECTION 2-2 SYMBOL BOARD

NOTES:

- MATERIAL:

1. Ø18mm HOLE SHALL BE STRICTLY IDENTICAL IN DIAMETER, LOCATION AND PROTECTED BY 2mm PVC PIPES.
2. MORE HOLES CAN BE ADDED
3. REINFORCED AREA BY STEEL BARS IN ADDITION TO THE TENDONS
4. POLE MANUFACTURERS ARE RESPONSIBLE FOR THE STRUCTURAL DESIGN
5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

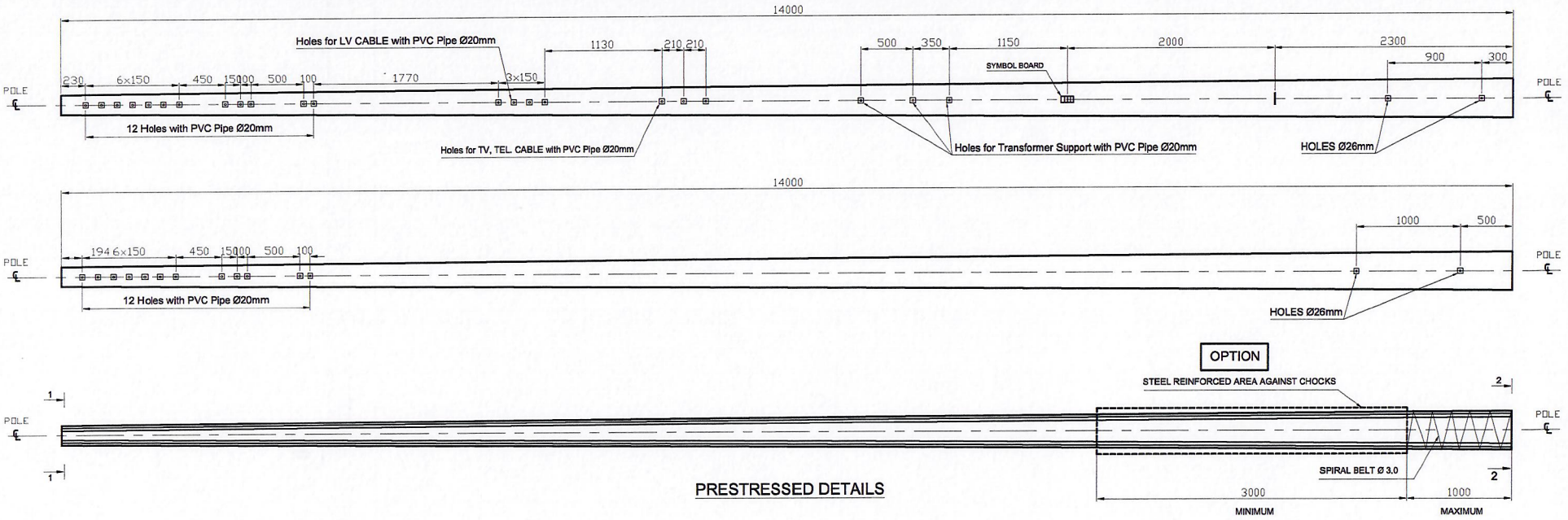
Position	Name	Signature	Date
Drawn by			
Prepared by			
Checked by			
Approved by			

14M LONG PRESTRESSED CONCRETE POLE CAPACITY **6.5 KN** (K = 2.5)

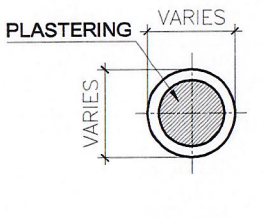
Project Name:

DWG No.	Scale
EDC02-CP-008	N.T.S

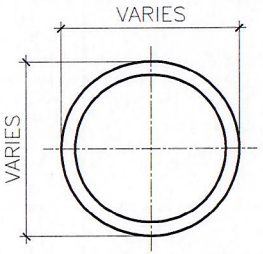
REV.01
Date :



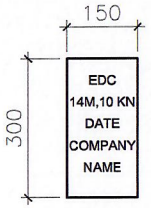
PRESTRESSED DETAILS



SECTION 1-1



SECTION 2-2



SYMBOL BOARD

NOTES:

- MATERIAL:

1. Ø18mm HOLE SHALL BE STRICTLY IDENTICAL IN DIAMETER, LOCATION AND PROTECTED BY 2mm PVC PIPES.
2. MORE HOLES CAN BE ADDED
3. REINFORCED AREA BY STEEL BARS IN ADDITION TO THE TENDONS
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5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

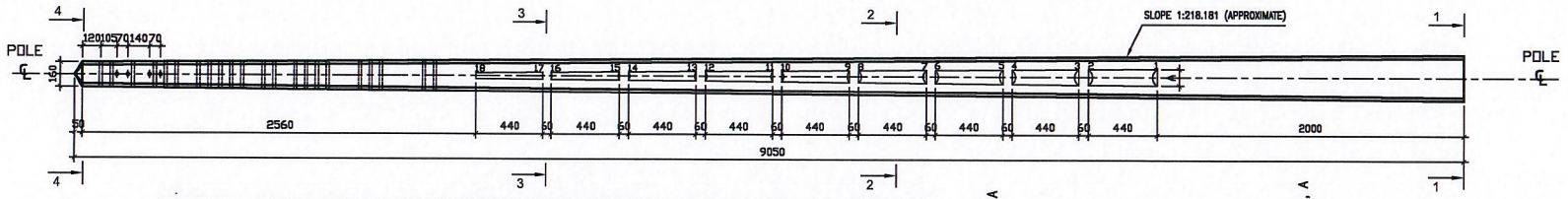
Position	Name	Signature	Date
Drawn by			
Prepared by			
Checked by			
Approved by			

14M LONG PRESTRESSED CONCRETE POLE CAPACITY **10 KN** (K = 2.5)

Project Name:

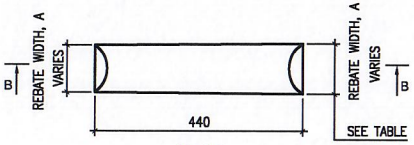
DWG No.	Scale
EDC02-CP-009	N.T.S

REV.01
Date :

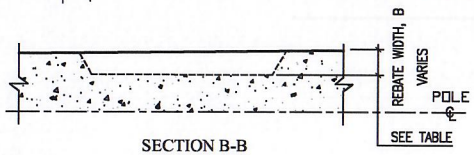


LOCATION No.		18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
REBATE WIDTH	A	39	46.6	47.6	54	55	62	63	70	71	77.7	78.7	85.5	86.5	93	94	101	102	109
REBATE DEPTH	B	10	13	14	18	18.6	22	23	27	28	32	32.7	36	37.5	41	42	46	47	51

SIDE VIEW
SCALE 1:30

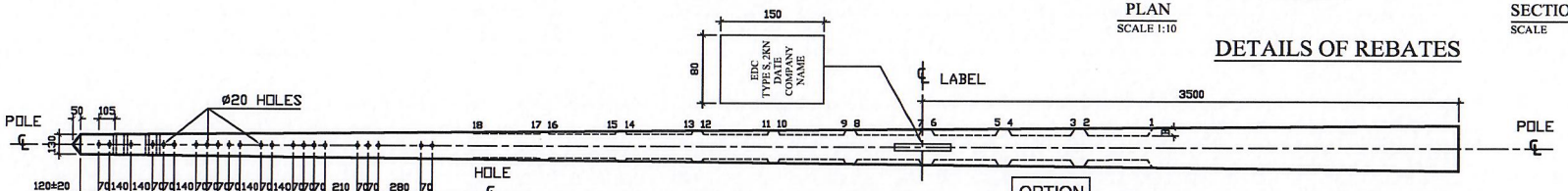


PLAN
SCALE 1:10

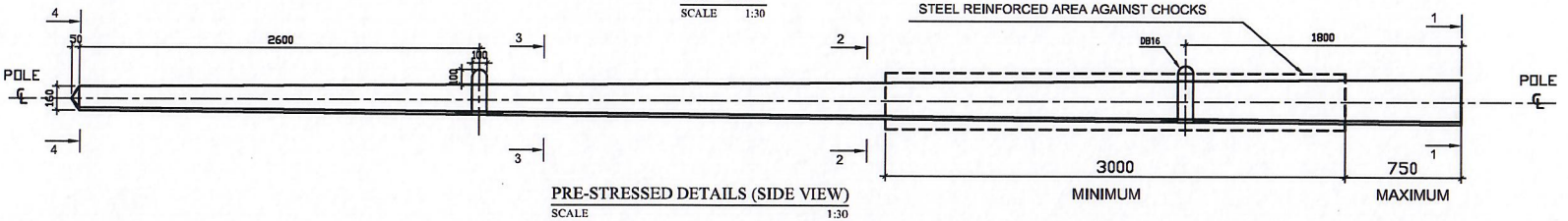


SECTION B-B
SCALE 1:10

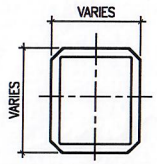
DETAILS OF REBATES



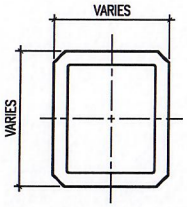
TOP VIEW
SCALE 1:30



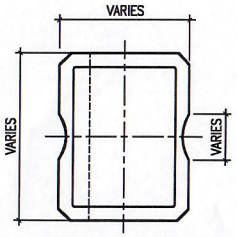
PRE-STRESSED DETAILS (SIDE VIEW)
SCALE 1:30



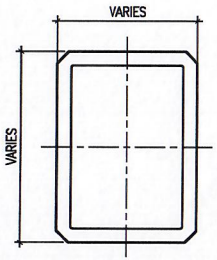
SECTION 4-4
SCALE 1:10



SECTION 3-3
SCALE 1:10



SECTION 2-2
SCALE 1:10



SECTION 1-1
SCALE 1:10

NOTES:

- MATERIAL:

1. Ø18mm HOLE SHALL BE STRICTLY IDENTICAL IN DIAMETER, LOCATION AND PROTECTED BY 2mm PVC PIPES.
2. MORE HOLES CAN BE ADDED
3. REINFORCED AREA BY STEEL BARS IN ADDITION TO THE TENDONS
4. POLE MANUFACTURERS ARE RESPONSIBLE FOR THE STRUCTURAL DESIGN
5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

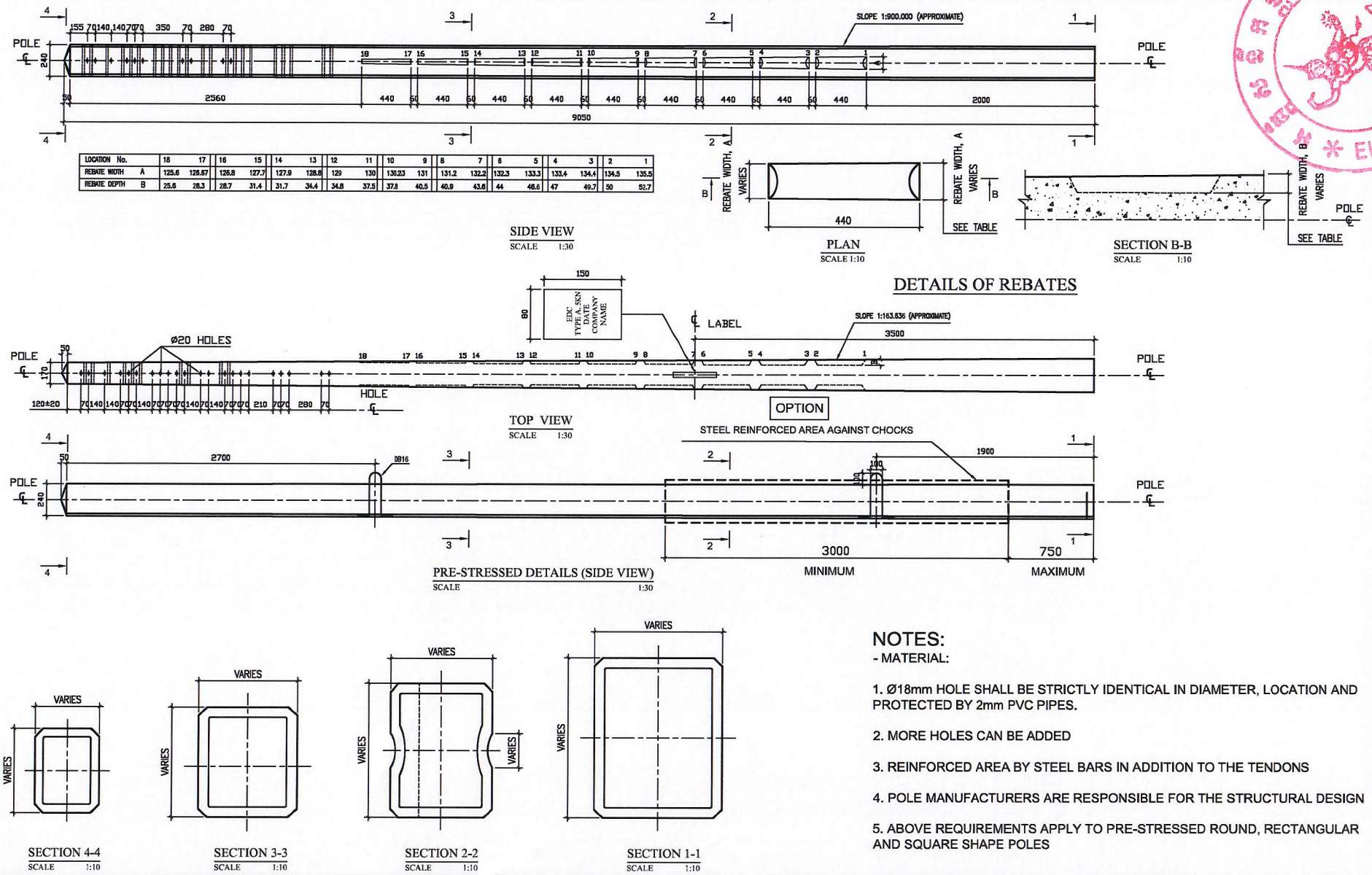
ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

Position	Name	Signature	Date
Prepare by			
Checked by			
Checked by			
Approved by			

9m Long Prestressed Concrete pole
Type **S** , Capacity **2** kN (K=2.5)

Weight	Scale
EDC02-CP-01	AS SHOWN

REV.01
Date :



LOCATION No.		18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
REBATE WIDTH	A	125.6	126.67	126.8	127.7	127.9	128.8	129	130	130.23	131	131.2	132.2	132.3	133.3	133.4	134.4	134.5	135.5
REBATE DEPTH	B	25.6	28.3	28.7	31.4	31.7	34.4	34.8	37.5	37.8	40.5	40.9	43.6	44	46.6	47	49.7	50	52.7

NOTES:

- MATERIAL:

1. Ø18mm HOLE SHALL BE STRICTLY IDENTICAL IN DIAMETER, LOCATION AND PROTECTED BY 2mm PVC PIPES.
2. MORE HOLES CAN BE ADDED
3. REINFORCED AREA BY STEEL BARS IN ADDITION TO THE TENDONS
4. POLE MANUFACTURERS ARE RESPONSIBLE FOR THE STRUCTURAL DESIGN
5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

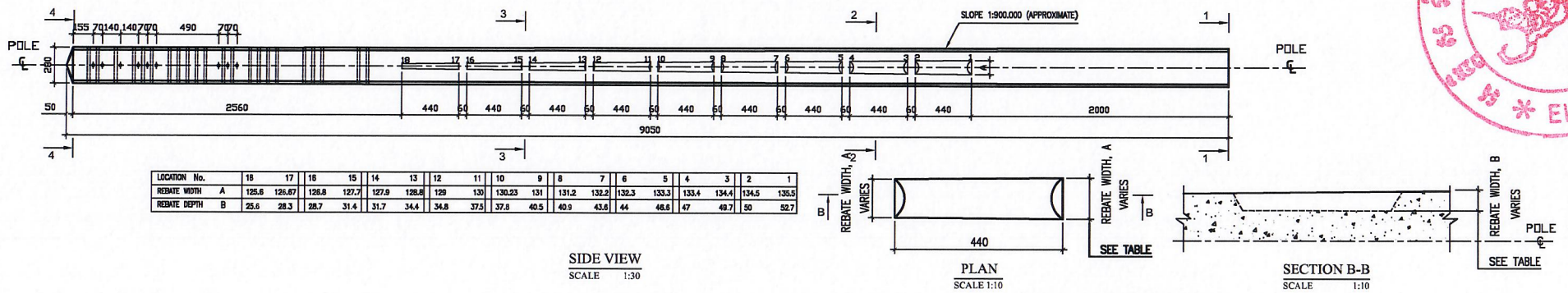
ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

Position	Name	Signature	Date
Prepare by			
Checked by			
Checked by			
Approved by			

9m Long Prestressed Concrete pole
Type **A** , Capacity **5** kN (K=2.5)

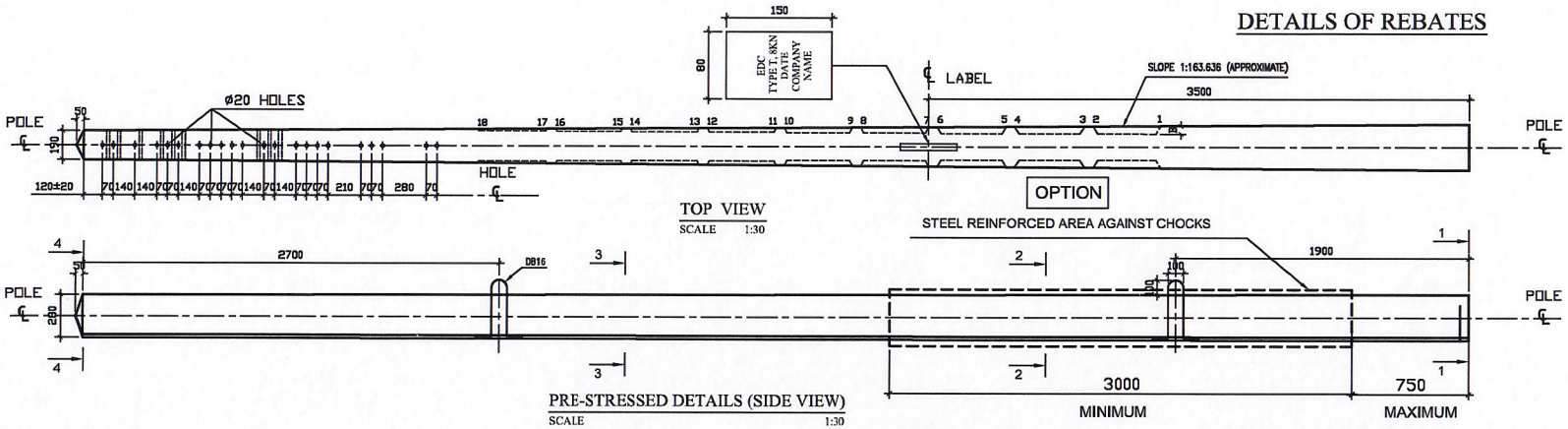
Weight	Scale
EDC02-CP-02	AS SHOWN

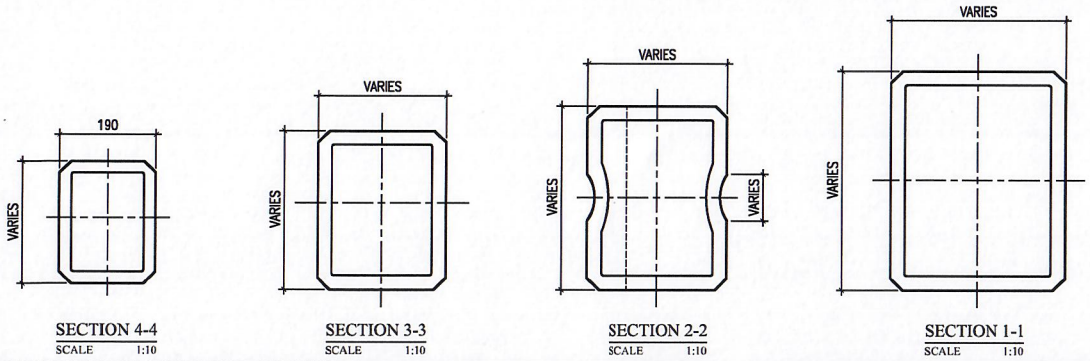
REV.01
Date :



LOCATION No.		18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
REBATE WIDTH	A	125.6	126.67	126.8	127.7	127.9	128.8	129	130	130.23	131	131.2	132.2	132.3	133.3	133.4	134.4	134.5	135.5
REBATE DEPTH	B	25.6	28.3	28.7	31.4	31.7	34.4	34.8	37.5	37.8	40.5	40.9	43.6	44	46.6	47	49.7	50	52.7

DETAILS OF REBATES





NOTES:

- MATERIAL:

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2. MORE HOLES CAN BE ADDED
3. REINFORCED AREA BY STEEL BARS IN ADDITION TO THE TENDONS
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5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

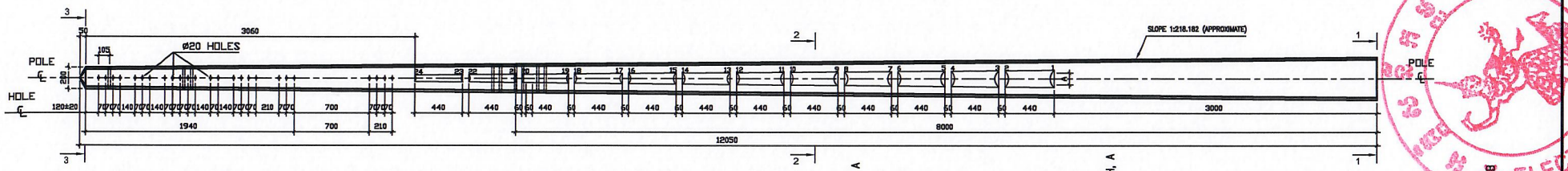
ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

Position	Name	Signature	Date
Prepare by			
Checked by			
Checked by			
Approved by			

9m Long Prestressed Concrete pole
Type **T** , Capacity **8** kN (K=2.5)

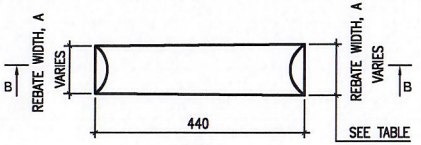
Weight	Scale
EDC02-CP-03	AS SHOWN

REV.01
Date :

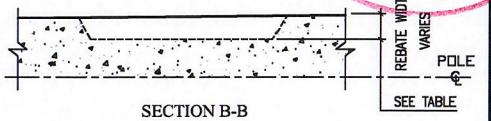


LOCATION No.		24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
REBATE WIDTH	A	61	68.3	69.3	76.6	77.6	85	86	93.9	94.3	101.6	102.6	109.9	110.9	118.3	119.3	126.6	127.6	134.9	135.9	143.3	144.3	151.6	152.60	159.9
REBATE DEPTH	B	35.6	37.9	38.7	41	41.9	44	45	47.2	48.2	50.3	51.3	53.4	54.5	56.5	57.5	59.6	60.7	62.7	63.9	65.8	67	68.9	70.2	72

SIDE VIEW
SCALE 1:35

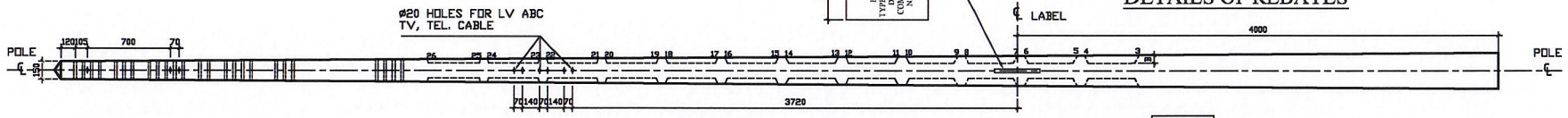


PLAN
SCALE 1:10



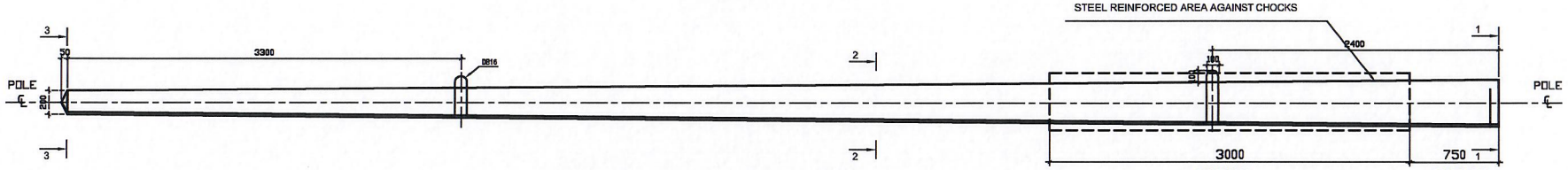
SECTION B-B
SCALE 1:10

DETAILS OF REBATES

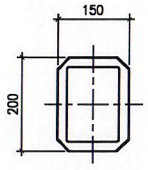


TOP VIEW
SCALE 1:35

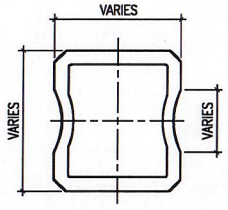
OPTION



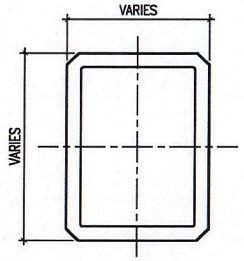
PRE-STRESSED DETAILS (SIDE VIEW)
SCALE 1:35



SECTION 3-3
SCALE 1:10



SECTION 2-2
SCALE 1:10



SECTION 1-1
SCALE 1:10

NOTES:

- MATERIAL:

1. Ø18mm HOLE SHALL BE STRICTLY IDENTICAL IN DIAMETER, LOCATION AND PROTECTED BY 2mm PVC PIPES.
2. MORE HOLES CAN BE ADDED
3. REINFORCED AREA BY STEEL BARS IN ADDITION TO THE TENDONS
4. POLE MANUFACTURERS ARE RESPONSIBLE FOR THE STRUCTURAL DESIGN
5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

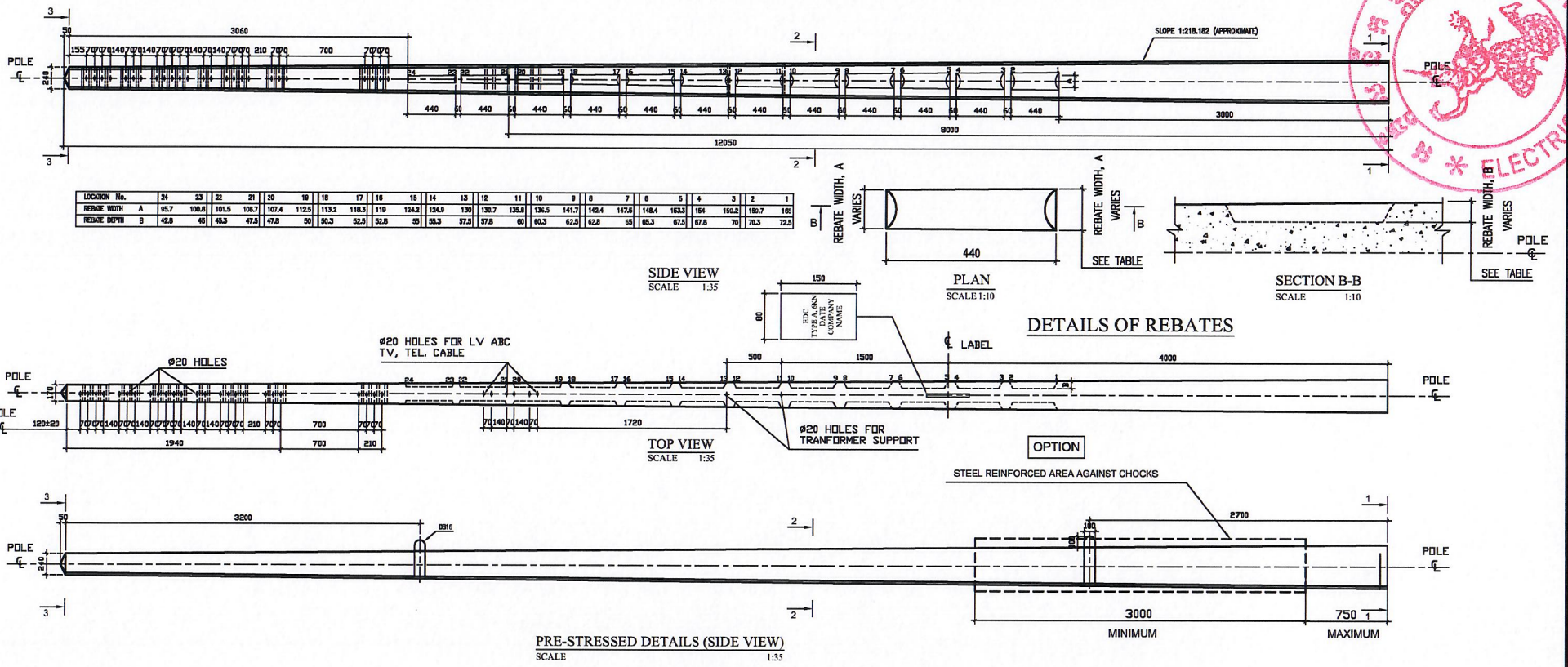
ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

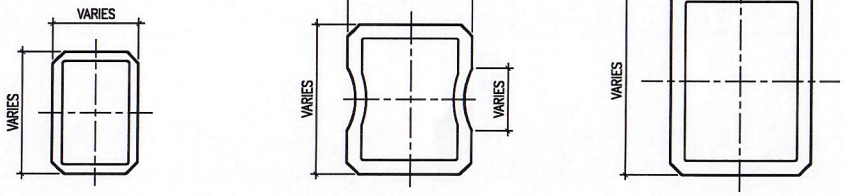
Position	Name	Signature	Date
Prepare by			
Checked by			
Checked by			
Approved by			

12m Long Prestressed Concrete pole
Type **S** , Capacity **3** kN (K=2.5)

DWG No.	Scale
EDC02-CP	N.T.S

REV.01
Date :





NOTES:

- MATERIAL:

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Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

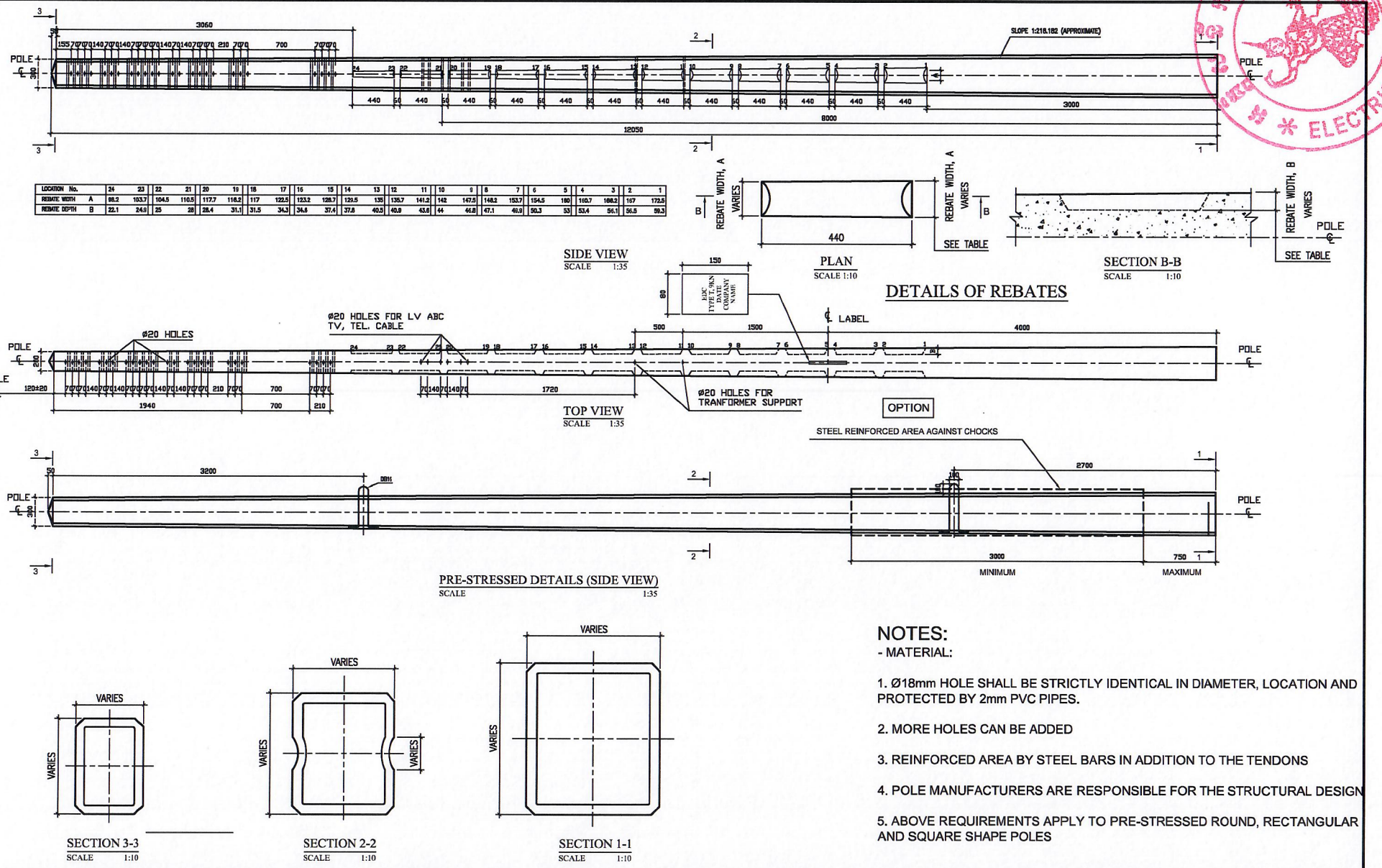
ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

Position	Name	Signature	Date
Prepare by			
Checked by			
Checked by			
Approved by			

12m Long Prestressed Concrete pole
Type **A** , Capacity **6** kN (K=2.5)

DWG No.	Scale
EDC02-CP	N.T.S

REV.01
Date :



LOCATION No.		24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
REBATE WIDTH	A	98.2	103.7	104.5	110.5	117.7	116.2	117	122.5	123.2	128.7	129.5	135	135.7	141.2	142	147.5	148.2	153.7	154.5	160	160.7	166.2	167	172.5
REBATE DEPTH	B	22.1	24.9	25	28	28.4	31.1	31.5	34.3	34.8	37.4	37.8	40.5	40.9	43.6	44	46.8	47.1	49.9	50.3	53	53.4	56.1	56.5	59.3

NOTES:

- MATERIAL:

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4. POLE MANUFACTURERS ARE RESPONSIBLE FOR THE STRUCTURAL DESIGN
5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

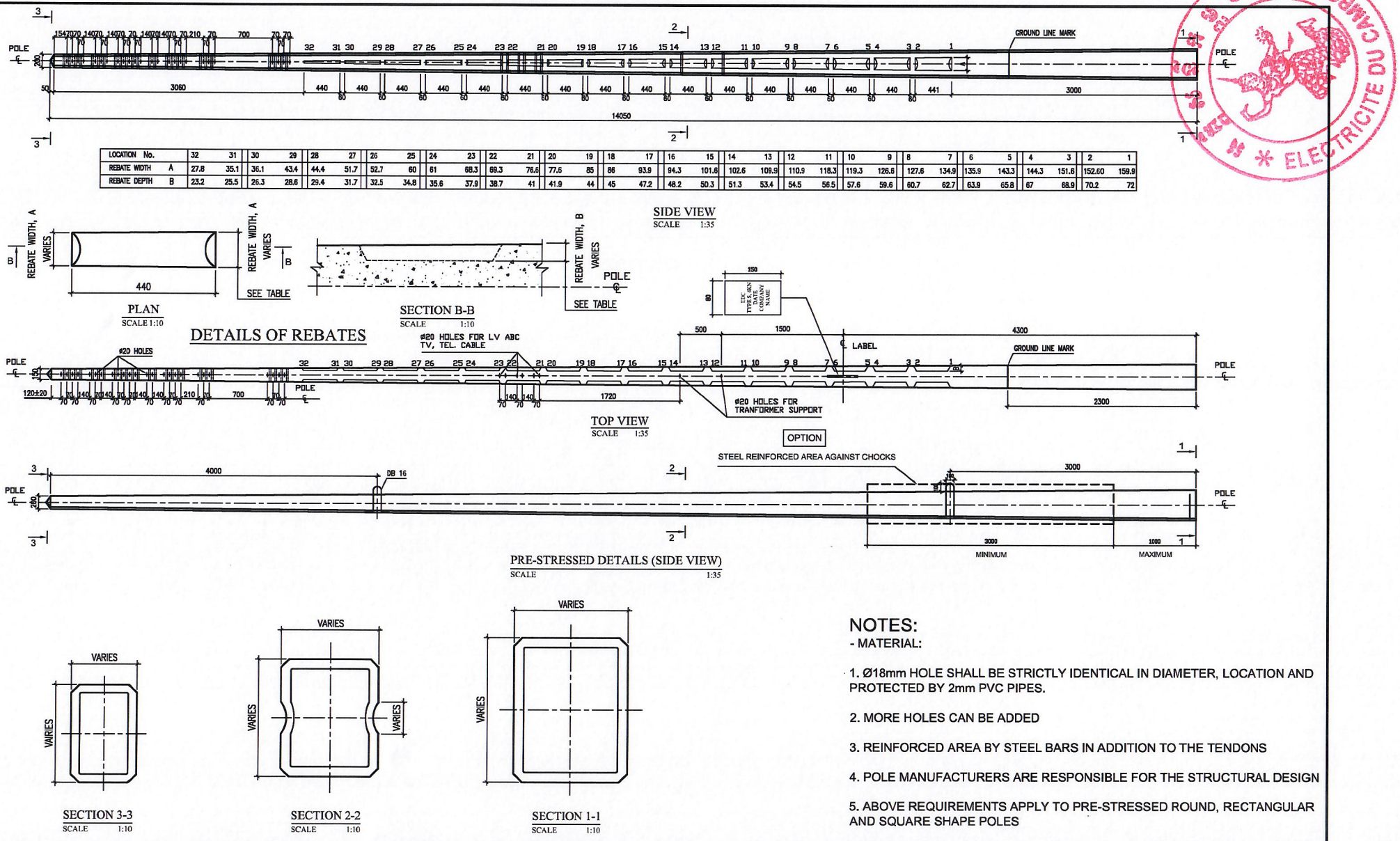
ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

Position	Name	Signature	Date
Prepare by			
Checked by			
Checked by			
Approved by			

12m Long Prestressed Concrete pole
Type **T** , Capacity **9** kN (K=2.5)

DWG No.	Scale
EDC02-CP-06	N.T.S

REV.01
Date :



LOCATION No.		32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
REBATE WIDTH	A	27.8	35.1	36.1	43.4	44.4	51.7	52.7	60	61	68.3	69.3	76.6	77.6	85	86	93.9	94.3	101.6	102.6	109.9	110.9	118.3	119.3	126.6	127.6	134.9	135.9	143.3	144.3	151.6	152.60	159.9
REBATE DEPTH	B	23.2	25.5	26.3	28.6	29.4	31.7	32.5	34.8	35.6	37.9	38.7	41	41.9	44	45	47.2	48.2	50.3	51.3	53.4	54.5	56.5	57.6	59.6	60.7	62.7	63.9	65.8	67	68.9	70.2	72

NOTES:

- MATERIAL:

1. Ø18mm HOLE SHALL BE STRICTLY IDENTICAL IN DIAMETER, LOCATION AND PROTECTED BY 2mm PVC PIPES.
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3. REINFORCED AREA BY STEEL BARS IN ADDITION TO THE TENDONS
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5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

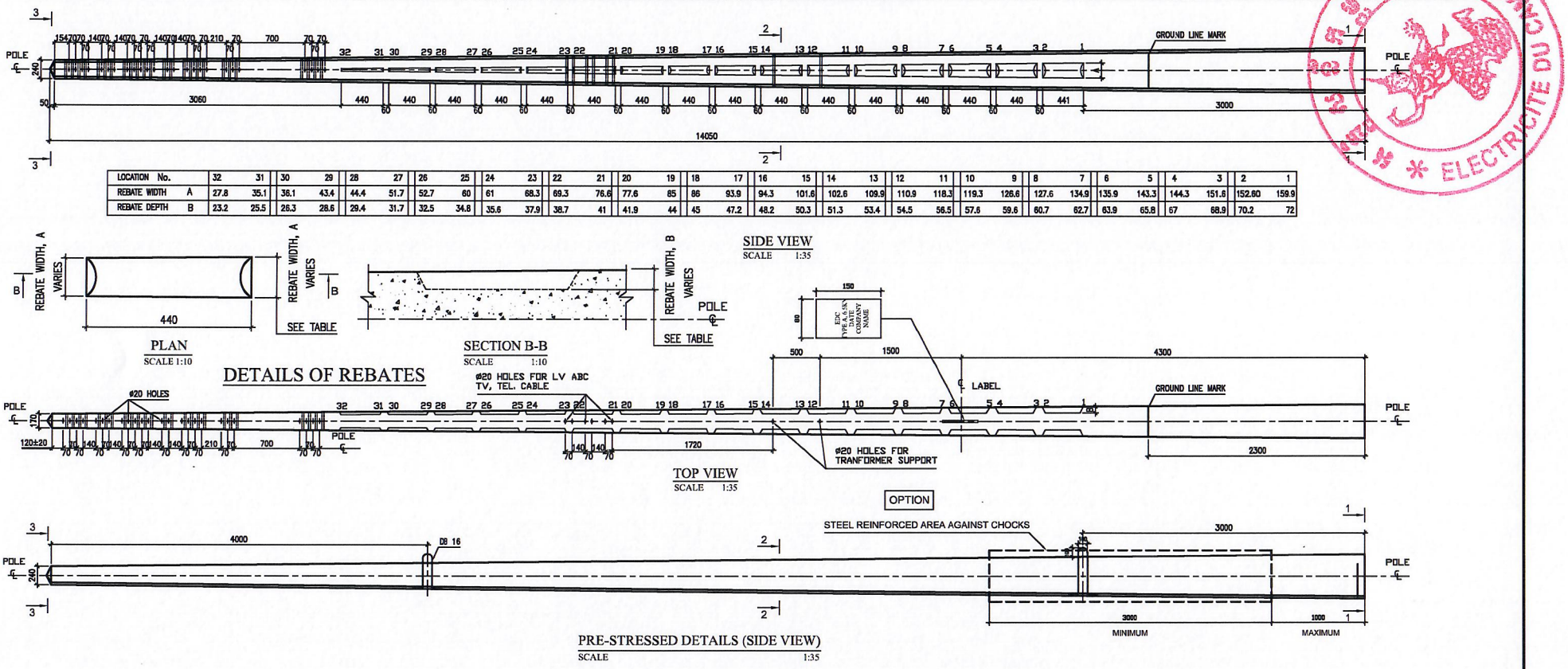
ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

Position	Name	Signature	Date
Prepare by			
Checked by			
Checked by			
Approved by			

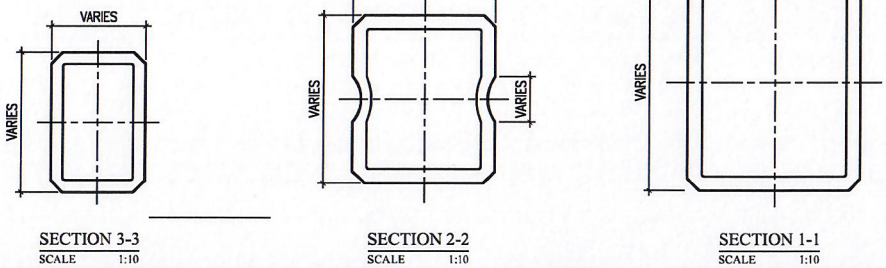
14m Long Prestressed Concrete pole
Type **S** , Capacity **4** kN (K=2.5)

DWG No.	Scale
EDC02-CP-07	N.T.S

REV.01
Date :



LOCATION No.		32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
REBATE WIDTH	A	27.8	35.1	36.1	43.4	44.4	51.7	52.7	60	61	68.3	69.3	76.6	77.6	85	86	93.9	94.3	101.6	102.6	109.9	110.9	118.3	119.3	126.6	127.6	134.9	135.9	143.3	144.3	151.6	152.60	159.9
REBATE DEPTH	B	23.2	25.5	26.3	28.6	29.4	31.7	32.5	34.8	35.6	37.9	38.7	41	41.9	44	45	47.2	48.2	50.3	51.3	53.4	54.5	56.5	57.6	59.6	60.7	62.7	63.9	65.8	67	68.9	70.2	72



NOTES:

- MATERIAL:

1. Ø18mm HOLE SHALL BE STRICTLY IDENTICAL IN DIAMETER, LOCATION AND PROTECTED BY 2mm PVC PIPES.
2. MORE HOLES CAN BE ADDED
3. REINFORCED AREA BY STEEL BARS IN ADDITION TO THE TENDONS
4. POLE MANUFACTURERS ARE RESPONSIBLE FOR THE STRUCTURAL DESIGN
5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

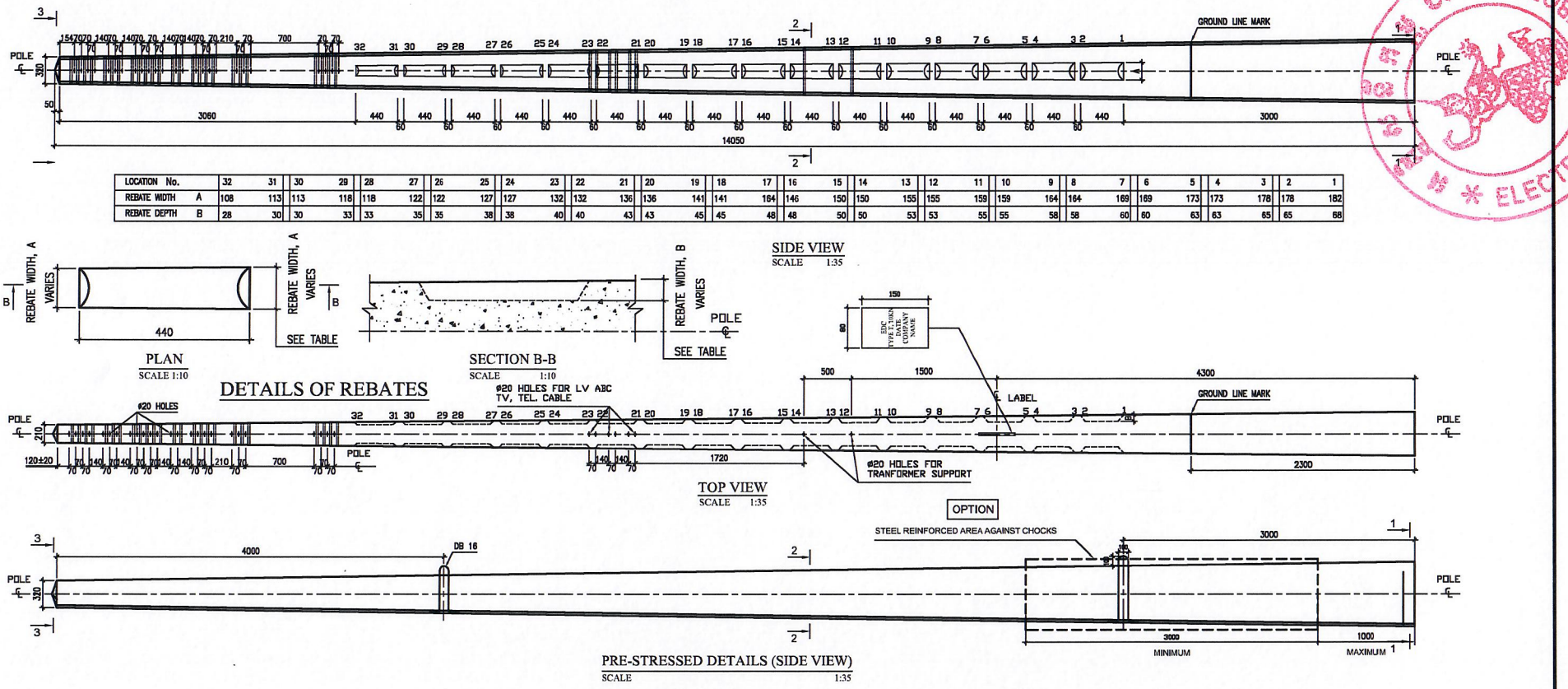
ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

Position	Name	Signature	Date
Prepare by			
Checked by			
Checked by			
Approved by			

14m Long Prestressed Concrete pole
Type **A** , Capacity **6.5** kN (K=2.5)

DWG No.	Scale
EDC02-CP-08	N.T.S

REV.01
Date :



NOTES:

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5. ABOVE REQUIREMENTS APPLY TO PRE-STRESSED ROUND, RECTANGULAR AND SQUARE SHAPE POLES

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

ELECTRICITE DU CAMBODGE
STREET 19, WATT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

Position	Name	Signature	Date
Prepare by			
Checked by			
Checked by			
Approved by			

14m Long Prestressed Concrete pole
Type **T** , Capacity **10** kN (K=2.5)

DWG No.	Scale
EDC02-CP-09	N.T.S

REV.01
Date :

8 Technical data sheet

No.	Description	Unit	Requirements	Supplier's Offer
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted.				
Concrete pole				
			☐	☐
	9m, Type S (2kN)		☐	☐
	9m, Type A (5kN)		☐	☐
	9m, Type T (8kN)		☐	☐
	12m, Type S (3kN)		☐	☐
	12m, Type A (6kN)		☐	☐
	12m, Type T (9kN)		☐	☐
	14m, Type S (4kN)		☐	☐
	14m, Type A (6.5kN)		☐	☐
	14m, Type T (10kN)		☐	☐
	Option: Base reinforcement if pre-stressed poles		☐	☐
1	Country		to be specified	
2	Manufacturer		to be specified	
3	Standards		to be specified	
4	Pole Length	m	to be specified	
5	Working Load	kN	to be specified	
6	Safety Factor		2.5	
7	**Type of pole**			
a	Pre-stressed steel structure		√ if yes	☐
b	Reinforced steel structure		√ if yes	☐
c	Spun circular pole		√ if yes	☐
d	Rectangular/square shape		√ if yes	☐
8	**Dimensions**			
a	Top diameter (spun pole)	mm	to be specified	
b	Top dimensions (rectangular/square pole)	mm	to be specified	
c	Butt diameter (spun pole)	mm	to be specified	
d	Butt dimensions (rectangular.square pole)	mm	to be specified	

9	Minimum thickness concrete at the base (pre-stressed pole)	mm	to be specified	
10	Minimum thickness concrete at the top (pre-stressed pole)	mm	to be specified	
11	Type of Cement		to be specified	
12	Weight of Pole		to be specified	
13	Minimum Cement Content	kg/m^3	to be specified	
14	Maximum Water/Cement Ratio	kg/m^3	to be specified	
15	Maximum diameter aggregates	mm	to be specified	
15a	Minimum diameter aggregates	mm	to be specified	
16	Concrete Cylinder Strength at 28 days	Mpa	to be specified	
17	Concrete Additives If yes, add details		to be specified	
18	Curing Method		to be specified	
19	Reinforcing Steel (reinforced pole)	Mpa	to be specified	
19a	Pre-stressed steel (pre stressed pole)	Mpa	To be specified	
19b	Diameter and number of bars/tendons		To be specified	
20	Holes as per EDC drawings		Mandatory	
21	Volume of pole	m3	to be specified	
22	Volume of concrete	m3	to be specified	
23	Weight of pole	kg	To be specified	
24	Manufacturer Pole structural design drawings is submitted within the bid. (Signed and stamped)		Yes	
25	Manufacturer authorisation submitted with the bid		Yes	
26	**OPTION Earthing connection inserted inside the pole**	Class T, A	☐	☐
27	Description of earthing wiring by bidder	To be filled by bidder		

Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted.

Deviation from the technical specification:

The bidder shall list point after point and explain here in after all deviation from the requested technical specification.

1/

2/

3/

Full technical information shall be supplied within the bid. If not, the offer shall not be considered.

Bidder signature: