

Concrete Power Poles

Technical Specification

Ausgrid / Endeavour Energy

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1.0 PURPOSE

To specify the requirements for concrete power poles and piles to be used on Ausgrid and Endeavour Energy's electrical networks.

2.0 SCOPE

This specification has been prepared in conjunction with Ausgrid and Endeavour Energy.

This specification covers the design, engineering, manufacture, testing, supply and delivery of concrete power poles and piles which will be used as part of Ausgrid or Endeavour Energy's overhead networks.

3.0 REFERENCES

All the goods supplied under this Contract must be designed, manufactured and tested in accordance with this technical specification and all relevant Australian Standards and International Standards (as amended from time to time), except where varied by this specification.

In the case of any inconsistencies between Australian and International Standards, the Australian standards shall prevail.

Relevant standards include, but are not limited to, those explicitly mentioned in these specifications, which are listed below.

AS/NZS 1170.1:2002	Structural design actions – General principles
AS/NZS 1170.2:2011	Structural design actions – Wind actions
AS 2159:2009	Piling – Design and Installation
AS 2700S:2011	Colour Standards for general purposes
AS 3600:2009	Concrete Structures
AS 3610:1995	Formwork of concrete
AS 3730.8:2006	Guide to the properties of paints for buildings - Latex - Exterior - Low-gloss
AS/NZS 4065:2010	Concrete utility services poles
AS/NZS 4676:2000	Structural design requirements for utility services poles
AS/NZS 7000:2010	Overhead Line Design – Detailed Procedures
AS/NZS ISO 9001-2008	Quality Management Systems – Requirements
AS/NZS ISO 14001-2004	Environmental management systems - Requirements with guidance for use

In case of any inconsistencies identified between the Australian Standards and this specification, this specification will take precedence.

4.0 DEFINITIONS AND ABBREVIATIONS

Hole former	Steel tube fitted to the pole to allow the attachment of fittings with a bolt through the pole.
Ferrule	Threaded insert placed in the pole to allow the attachment of fittings to the pole with a bolt.
Earthing ferrule	Threaded insert placed in the pole that is electrically connected to the internal earthing system of the pole.

5.0 CONCRETE POLES AND PILES

5.1 General Requirements

The Supplier will be required to provide two ranges of poles. The first range is for direct buried poles, in accordance with the requirements of Table 1, Table 2 and Table 3. Table 3 provides a list of job specific poles which have set fittings requirements. These poles follow the range listed in Appendix J of AS/NZS 4676

The second range of poles must be supplied suitable for erection mounted on piles (also to be supplied). Refer Table 4.

Ultimate Strength is the limit state strength value, expressed as an equivalent pole tip loading. Length is total length of assembled pole from pole butt to pole tip. For each pole the number of sections per pole, section weights and the total weight of the pole are to be included in the schedules.

All poles must be capable of being supplied with fittings and extra options selected from the range shown in Table 5. The number, location and orientation of each fitting shall be specified for each pole as orders are placed.

Pole/pile combinations are to be supplied for situations where ground conditions require the use of greater than normal embedment depths for the anticipated pole tip loads. Pile mounted pole lengths shall range from 12 to 37.5 metres, with preferred lengths shown in Table 4. Piles are to be available for all poles in this range. Pile lengths are intended to cover the range from 7.0 to 15.0 metres, preferably in 0.5m increments, but alternatives may be offered.

Pile mounted poles and their associated piles must be supplied with a suitable interface to facilitate mounting of the pole on the pile top. Continuity of the pole earthing through the pile to the pile butt plate must be incorporated into the design. The joint must be designed to avoid damage to the pole steel work by moisture ingress.

All poles within the scope of this document are to be reviewed and approved by the relevant organisation's Primary Systems Manager or their delegate prior to being ordered and/or installed in the network.

5.1.1 Service Conditions

All poles supplied shall be designed to achieve a maintenance free life of at least 60 years under the conditions outlined in Appendix D, and Table D2 of AS/NZS 4676 for an exposure class B2. The pole caps and ground line insulating cover shall provide the same durability as that of the pole.

6.0 Technical requirements

6.1 Material and Workmanship

Transmission poles and piles must be prestressed high durability spun concrete construction unless otherwise specified at the time of ordering. Distribution poles below 15.5m shall be of reinforced concrete construction.

Concrete poles must be manufactured and supplied to all the requirements of Australian Standards AS/NZS 4065, and AS 4676, and in every respect to the satisfaction of the Purchaser. They shall also meet the requirements of Appendix I of AS/NZS 7000.

Concrete piles must be manufactured and supplied to all the requirements of Australian Standard AS/NZS 4065 and AS 2159, where relevant, and in every respect to the satisfaction of the Purchaser.

The Pole Designations shown in the tables are of the overall pole length and ultimate strength capacity (limit state value expressed as an equivalent pole tip loading) in conformity with AS/NZS 7000.

6.2 Shape

Poles shall be circular in cross-section, with uniform strength characteristics in all directions. Poles having essentially uniform strength characteristics in all directions (such as hexagonal sections) shall be regarded as circular for the purposes of this Specification.

Poles shall have a nominal uniform taper from tip to butt of 15mm in diameter for each metre of pole length. Poles are anticipated to have an approximate tip diameter between 225mm and 500mm depending on the length and strength requirements.

Poles with alternative tapers or cross-sections will be considered only if it can be shown that they are compatible with existing fittings and drawings. Any changes to such fittings, drawings or methods of attachment will be the responsibility of the pole supplier.

6.3 Tolerances

Dimensional tolerances shall be as specified in clause 2.3.7 of AS/NZS 4065;

- Length of pole, ± 50 mm.
- Straightness of pole, 3 mm/m length.
- Overall cross-sectional dimensions of pole, +5 mm and -3 mm.
- Distance between critical hole centres ± 2 mm.
- Distance between non-critical centres, ± 10 mm.
- Distance between step bolt anchorages, ± 20 mm.
- Uppermost hole from top of pole, ± 10 mm.
- Hole positions measured on circumference, ± 3 mm.
- Angle between holes and longitudinal axis of pole, 2° .
- Other dimensions, ± 10 mm.
- Depth below surface of ferrules –
 - a. Step bolts, ≤ 6 mm; and
 - b. Other, ≤ 3 mm.
- Pole mass (for handling), +10% and -5%.

- External Cover, +10mm, and -0mm.
- Internal Cover, -0mm.

Additionally the deviation of the pole from straightness is allowed in one plane and one direction only.

6.4 Cracking Acceptance Criteria

Under a Sustained load of 30% of the pole's Ultimate strength the value of crack width included in Clause D3.7 of AS/NZS 4676 for Temperate coastal, 0.2mm will be accepted, but only as an absolute maximum. For Marine Environment poles, a crack width of 0.1mm will only be tolerated.

6.5 Additional Corrosion Protection

Where poles and piles are to be located in external marine exposure conditions (within 1.0 km of coast), the purchaser may specify that a "Marine Environment" pole is required. Concrete cover for Marine Environment poles, shall be as defined in Clause 4.2.5 of AS/NZS 4676 and Section 4 of AS 3600.

Alternatively a corrosion inhibitor may be added to the concrete.

6.6 Protection of Stressed Tendons and Anchorages

Corrosion protection must be applied to all tendons and anchorages. The Supplier is to provide details of the method proposed.

6.7 Step Bolt Anchors

Step bolt anchors shall be in accordance with clause 3.1.3 of AS/NZS 4065;

- Manufactured of stainless steel, machinable grade, series designation 304 complying with AS 2837, or they shall be manufactured of an alternative material of adequate strength and durability.
- Rigidly set in the pole wall and shall be capable of sustaining, without visible damage, non-concurrent load cases of a pull-out load of 4 kN and bending and shear forces applied in accordance with Figure 3.1.3 of AS/NZS 4065.
- Located vertically at 450 mm staggered centres, diametrically opposite each other for pole widths up to and including 400 mm, and splayed radially at 120° for widths in excess of 400 mm.

and located in accordance with the relevant design drawings.

6.8 Provision of Hole Formers and Ferrules

Hole formers and ferrules shall comply with the requirements of clause 3.1.4 of AS/NZS 4065;

- Holes and ferrules shall be provided in concrete poles as required by the particular application. Where so provided, due account shall be taken of their presence in the design of the pole or, if the design is by prototype testing, they shall be tested with the holes or ferrules in place.

They shall be manufactured of stainless steel, of adequate strength and durability.

In addition to the requirements of clause 3.1.4 of AS/NZS 4065, all holes should pass diametrically through the pole perpendicular to the longitudinal axis.

The manufacturer shall ensure that all holes and ferrules are free of any obstructions that would impair the attachment of relevant fittings by insertion or screwing.

The position of hole formers and ferrules shall be in accordance with the relevant design drawings supplied by the purchaser.

All ferrules shall be electrically connected to the pole earthing system.

6.9 Pole Caps

Poles shall be fitted with a pole cap. The pole cap shall have a non-reflective finish, such as galvanised steel or brushed stainless steel.

The joint between the pole top and pole cap shall be sealed using a suitable sealant, and sufficient sealant shall be used to ensure a complete seal between the pole cap and the surface of the pole.

Details and drawings of the pole cap construction and how it is secured to the pole shall be provided with the offer.

6.10 Butt Plates

All poles and piles shall be suitable for fitting with a stainless steel butt earthing plate with varying thicknesses specified in Table 5. The plate shall be fixed to the pole with four (4) M16 ferrules at the pole butt with stainless steel bolts, spring and flat washers.

The ferrules will be electrically connected to the internal earthing conductor as specified in clause 3.1.6 of AS/NZS 4065.

The joint between the pole butt and plate shall be sealed using a suitable sealant. Sufficient sealant shall be used to ensure a complete seal. The sealant shall also be visible around the flange of the plate for the full circumference of the pole. The sealant shall not interfere with the electrical connection between the plate, bolts and ferrules.

Details and drawings of the butt plates and how they are secured to the pole shall be provided with the offer.

6.11 Earthing Requirements

The earthing conductor shall meet the requirement of Clause 3.1.6 of AS/NZS 4065, being continuous from the head of the pole to the butt, with continuity maintained through all joints, including joints between a pole and its associated pile, capable of carrying a minimum of 26kA for one (1) second, and shall have a cross section not less than 190mm² of steel.

Earthing ferrules shall be capable of carrying a minimum of 26kA for one (1) second. They shall be drilled and tapped to a minimum depth of 25mm, and provide a flat surface for attachment of earthing conductors or accessories.

The pole earthing system shall be designed to, where possible, limit the damage to the pole resulting from a lightning stroke entering the pole at the pole cap, crossarm or any piece of external hardware that is electrically connected to the pole earthing system.

6.12 Surface Finish

The formed surfaces of poles and piles shall satisfy the requirements of clause 2.3.6 of AS/NZS 4065 and to surface class 2 of AS 3610. No sharp protrusions or edges are to be present when the poles and piles are delivered.

6.13 Handling and Storage Requirements

Poles and Piles must be constructed so as to allow handling, erection and transport without causing damage to the poles or piles. In particular, the Supplier must supply details of preferred lifting techniques, including any special equipment required, and recommended storing methods. The Supplier must nominate the minimum number of bearing points for each particular pole or pile, for both transporting and storage, and the minimum dimensions recommended for each bearer, together with the maximum unsupported overhang allowable during transportation or storage.

6.14 Marking of Poles and Piles

The permanent marking must be impressed on a metal plate affixed to the pole or pile to the requirements of Clause 1.6 of AS/NZS 4065 and relevant drawings set out in Clause 8.0 of this specification.

As a minimum, the nameplate shall contain the following information:

- Manufacturer - Location
- Month of Manufacture – Year of Manufacture
- Pole Length - m
- Ultimate Load – kN ULS
- Pole Mass - kg
- Manufacturer's serial number
- Purchaser name - Purchaser Pole Code

Following manufacture, the mass of each pole and pile must be measured, recorded and checked for compliance with the stated figures. The measured mass must be clearly marked on the butt. A non-permanent mark shall be provided to indicate the centre of gravity for lifting purposes.

The pole or pile number provided in the order must be clearly marked on the butt plate to enable delivery to correct peg.

6.15 Painting of Poles and Piles

For areas of moderate to high public visibility, the Purchaser may specify a painted pole. Where colour painting is required; the colour shall be G65 Ti Tree, from AS 2700S. The painting of the poles must use acrylic paint to AS 3730.8: Guide to the properties of paints for buildings - Latex - Exterior - Low-gloss. The pole must be painted from the top to at least one metre below the nominated ground line.

The surface preparation and the application of the finish coats must be to the paint manufacturer's directions and shall be applied by either a brush or roller. The paintwork is to be free from defects such as, but not limited to; flaking, bubbling, streaking, variations in colour, and variations in coverage, upon arrival at the designated site. Safety Data Sheets are to be provided to the Purchaser for any paint to be used.

6.16 Torsional Load

All poles shall be designed to meet the torsional testing requirements of AS/NZS 7000 and AS 2159. Where the Purchaser requires poles to be designed for torsional loads in excess of those required by the above Standards, the Purchaser will provide full loading requirements. The Supplier must submit calculations and/or tests proving the torsional strength of their design.

6.17 Additional Pile Details

Piles are to be designed to have their attachment point to the pole at a height of 1.5m above the ground. Pile length will be determined on an individual case basis.

Preference shall be given to piles designed to cater for multiple sizes and strengths of poles, thus limiting the number of different pile types necessary. Requirements for the modification of poles to suit attachment to piles must be provided.

Piles must conform to all test requirements detailed in Clause 8 of AS 2159 within the specified strength and structural characteristics nominated by the supplier.

Additional information and drawings must be provided showing installation procedures and the method of attachment to poles.

6.18 Structural Design

The Supplier is responsible for the design of the pole elements and attachments specified in the tables contained in Clause 9.0 of this specification. The Supplier must:-

- Prepare design calculations to ensure that the poles are adequate for the strength limit state loads.
- Prepare detailed drawings of all pole and pile elements.
- Provide certification of the design and drawings for all Supplier designed works under this Specification. Such certification is to be provided by a Professional engineer who is a Chartered professional Engineer listed on the National Professional Engineers Register (NPER) or accepted equivalent.
- Provide certification that the works are manufactured in accordance with the design and specification. Such certification is to be provided by a Professional engineer who is a Chartered professional Engineer listed on the National Professional Engineers Register (NPER) or accepted equivalent.
- Provide a written confirmation that the design process and practices adopted by the Supplier are in accordance with sound industry practice.
- Provide the pole geometry and material properties for all the poles and piles offered, for modeling purposes in line design software like PLS-CADD, TL-Pro or equivalent.
- Provide recommended embedments for each pole based on poles being direct embedded and the surrounding soil having average bearing strength of 120kPa.

All pole and piles are to be designed and manufactured in accordance with AS/NZS 7000, AS/NZS 4065 and AS 3600, where applicable. Where these standards have different requirements, it must be referred by the Supplier to the Purchaser for resolution.

6.19 Serviceability Limit State Design Criteria

The Purchaser has established the following standards for serviceability limits on pole deflection. Alternative offers may be made, but the Purchaser reserves the right to require compliance with these standards.

Structures are to have a maximum total deflection of 4% of the above ground pole length for prestressed poles and 6% for reinforced poles, whilst 50% of the ultimate pole tip load is applied to the pole tip.

The poles (including attachment fittings supplied as part of the pole design) are to withstand a torsional force of at least 15kNm. Under this force there is to be no buckling, wrinkling or

permanent deformation in the structure or fittings, although minor ovalising of holes or deformation of bolts is acceptable.

6.20 Bushfire Resilience

The Purchaser requires evidence of the durability of poles in respect to one or more grass or bush fires. An example of possible evidence may include; compliance with the Forest & Wood Products Australia Limited publication: “Assessing the ability of a large-scale fire test to predict the performance of wood poles exposed to severe bushfires and the ability of fire retardant treatments to reduce the loss of wood poles exposed to severe bushfires” (Project No: PNA014-0708). This publication can be used as reference to heat exposure test methods in the absence of other relevant specifications.

6.21 Repairs

The Utilities reserve the right to reject any pole or pile having a substantial defect, such as loss of concrete fines through the mould, surface blemishes due to incomplete application of release agent to the mould, incorrect positioning of ferrules or hole formers, cracking, chipping, exposed reinforcement or defects of any other kind which render the pole unfit for purpose.

If repairs are deemed appropriate, they may be carried out only with prior approval from the relevant organisation's Manager, Primary Systems or their delegate. In addition to the requirements of Clause 5.9 of AS/NZS 4676, the service life and strength of repaired poles or piles shall be no less than undamaged poles or piles, unless agreed to by the relevant Utility.

7.0 TESTING REQUIREMENTS

7.1 Type Tests

All type tests shall be carried out by a testing authority/laboratory holding accreditation:

- by NATA Australia; or,
- by an accreditation authority recognised by NATA Australia.

Tests from other testing authorities may be accepted at the discretion of the relevant organisation's Manager, Primary Systems or their delegate.

All type test reports shall be accompanied by copies of the accreditation certificate(s) issued to the testing laboratory. The accreditation certificate(s) shall be valid for the relevant test(s) and for the duration of the test(s).

Type tests shall be less than ten (10) years old. Type tests beyond this limit may be submitted provided sufficient information to demonstrate that the manufacturing process, raw materials, design and quality control processes have not significantly changed since the original test date is also submitted with the offer.

All documentation submitted (including reports, tests, testing procedures/policies, calibration certificates and the like) shall be in English.

Type test certificates shall specify the overall dimensional details of the poles, test assembly, procedure, test requirement and test results. Test certificates only indicating that the items have passed without listing the test conditions above will be deemed non-compliant.

Irrespective of the pole or pile length and strength, each class of pole or pile (single piece poles, multi-piece poles, single piece piles and multi-piece piles) will each only require one type test.

The type tests required to be submitted with the offer are:

Standard	Reference clause	Test	Pass Criteria
AS/NZS 4676	3.9.2, 3.9.4, 7 and Appendix K	• The strength and serviceability of the poles listed in Tables contained in Clause 9.0.	• Pole deflection under forces on the pole of not less than 50% of its ultimate strength shall not exceed 4% (prestressed) or 6% (reinforced) of the pole length above ground. • The results of this type test as per Appendix K, Clause K6 shall be provided with the offer.
AS/NZS 7000	8.5		• For serviceability, the test specimen shall be deemed to comply with the serviceability requirements of this Standard if, under the serviceability limit-state test load, the measured serviceability indicators are within the specified limits appropriate to the pole application. • For strength, the test specimens shall be deemed to comply with the strength requirements of this Standard if the specimens are able to withstand the strength limit-state test load for not less than 2 min. • The results of this test as per Clause 8.5.4 of AS/NZS 7000 shall be provided with the offer.

AS 4676	3.9.2, 3.9.4, 7 and Appendix K	The strength and serviceability of the piles listed in Table contained in Clause 9.0.	Pile deflection under forces on the pole of not less than 50% of its ultimate strength shall not exceed 4% (prestressed) or 6% (reinforced) of the pole length above ground. - The results of this type test as per Appendix K, Clause K6 shall be provided with the offer.
-	-	The pole's earthing system shall be capable of safely conducting, without damage to the pole the energy associated with a system earth fault.	- A minimum fault current level of 26kA for 1 second is required. - Evidence may comprise of design calculations or test reports.

7.2 Routine Test

All materials used as part of this Specification are subject to the tests and inspections typical for industry best practice. Results from any such tests shall be made available to Purchaser on request, to determine compliance with this Specification and to prove their safety and suitability for their intended use.

Details of Routine tests performed by the Supplier should accompany any Tender submission.

8.0 DRAWINGS

Drawing no. 056303 – Overhead Transmission Concrete Pole Type H1 Landing Structure Hole Former and Ferrule Layout (Endeavour Energy)

Drawing no. 240257 – Overhead Transmission 132kV Concrete Pole Type 80C UG/OH Hole Former & Ferrule Layout (Endeavour Energy)

Drawing no. 280236 – Overhead Transmission 33kV Concrete Pole Type 50C UG/OH Hole Former & Ferrule Layout (Endeavour Energy)

Drawing no. 282831 – Concrete Stay Poles Type H1-H2 Hole Former & Ferrule Layout. (Endeavour Energy)

Drawing no. 288603 – Overhead Transmission 33kV Concrete Pole Type 50V UG/OH Hole Former & Ferrule Layout (Endeavour Energy)

Drawing no. 295244 – Overhead Transmission 33kV Concrete Pole Type Rec Hole former & ferrule layout (Endeavour Energy)

Drawing no. 295702 – Overhead Transmission 132kV Concrete Pole Type 80 Serier Hole former & Ferrule Layout (Endeavour Energy)

Drawing no. 295703 – Overhead Transmission 33/66kV Concrete Pole Type 60 Serier Hole former & Ferrule Layout (Endeavour Energy)

Drawing no. 295704 – 66kV Concrete Pole Type 70 Hole former & Ferrule Layout (Endeavour Energy)

Drawing no. 316946 – Overhead Construction Concrete Pole 11kV Voltage Regulator Hole former & ferrule layout (Endeavour Energy)

Drawing no. 331149 - Overhead construction concrete/steel or other pre-drilled pole hole former and ferrule layout. (Endeavour Energy)

Drawing no. 344474 – Overhead Transmission 66kV Concrete Pole Type 60C UG/OH Hole Former & Ferrule Layout (Endeavour Energy)

Drawing no. 353213 – Overhead Transmission 33/66kV Concrete Pole Type Load Break Switch Hole Former & Ferrule Layout (Endeavour Energy)

Drawing no. 366818 – Overhead Transmission 132kV Concrete Pole Type 80VC UG/OH Hole Former & Ferrule Layout (Endeavour Energy)

9.0 SPECIFIED ITEMS

Table 1 - Direct Buried Poles

Item No.	Pole Length (m)	Ultimate Tip Load (kN)	Item No.	Pole Length (m)	Ultimate Tip Load (kN)
1	8	10	48	21.4	16
2	8	16	49	21.4	24
3	8	24	50	21.4	32
4	9.5	10	51	21.4	40
5	9.5	16	52	21.4	60
6	9.5	24	53	21.4	80
7	10	60	54	23	16
8	10	80	55	23	24
9	10	100	56	23	32
10	11	10	57	23	40
11	11	16	58	23	60
12	11	24	59	23	80
13	11	32	60	24	16
14	11	40	61	24	24
15	12.5	10	62	24	32
16	12.5	16	63	24	40
17	12.5	24	64	24	60
18	12.5	32	65	24	80
19	12.5	40	66	26	24
20	14	10	67	26	32
21	14	16	68	26	40
22	14	24	69	26	60
23	14	32	70	26	80
24	14	40	71	28	24
25	15.5	10	72	28	32
26	15.5	16	73	28	40
27	15.5	24	74	28	60
28	15.5	32	75	28	80
29	15.5	40	76	30	24
30	17	16	77	30	32
31	17	24	78	30	40
32	17	32	79	30	60
33	17	40	80	30	80
34	17	60	81	32	24
35	17	80	82	32	32
36	18.5	16	83	32	40
37	18.5	24	84	32	60
38	18.5	32	85	32	80
39	18.5	40	86	34	40
40	18.5	60	87	34	60
41	18.5	80	88	36	40
42	20	16	89	36	60
43	20	24	90	36	80
44	20	32	91	38	60
45	20	40	92	38	80
46	20	60			
47	20	80			

Table 2 - High Strength Poles

Item No.	Pole Length (m)	Ultimate Tip Load (kN)	Item No.	Pole Length (m)	Ultimate Tip Load (kN)	Item No.	Pole Length (m)	Ultimate Tip Load (kN)
93	20	100	132	21	130	171	19	160
94	20.5	100	133	21.5	130	172	19.5	160
95	21	100	134	22	130	173	20	160
96	21.5	100	135	22.5	130	174	20.5	160
97	22	100	136	23	130	175	21	160
98	22.5	100	137	23.5	130	176	21.5	160
99	23	100	138	24	130	177	22	160
100	23.5	100	139	24.5	130	178	22.5	160
101	24	100	140	25	130	179	23	160
102	24.5	100	141	25.5	130	180	23.5	160
103	25	100	142	26	130	181	24	160
104	25.5	100	143	26.5	130	182	24.5	160
105	26	100	144	27	130	183	25	160
106	26.5	100	145	27.5	130	184	25.5	160
107	27	100	146	28	130	185	26	160
108	27.5	100	147	28.5	130	186	26.5	160
109	28	100	148	29	130	187	27	160
110	28.5	100	149	29.5	130	188	27.5	160
111	29	100	150	30	130	189	28	160
112	29.5	100	151	30.5	130	190	28.5	160
113	30	100	152	31	130	191	29	160
114	30.5	100	153	31.5	130	192	29.5	160
115	31	100	154	32	130	193	30	160
116	31.5	100	155	32.5	130	194	30.5	160
117	32	100	156	33	130	195	31	160
118	32.5	100	157	33.5	130	196	31.5	160
119	33	100	158	34	130	197	32	160
120	33.5	100	159	34.5	130	198	32.5	160
121	34	100	160	35	130	199	33	160
122	34.5	100	161	35.5	130	200	33.5	160
123	35	100	162	36	130	201	34	160
124	35.5	100	163	36.5	130	202	34.5	160
125	36	100	164	37	130	203	35	160
126	36.5	100	165	37.5	130	204	35.5	160
127	37	100	166	38	130	205	36	160
128	37.5	100	167	17	160	206	36.5	160
129	38	100	168	17.5	160	207	37	160
130	20	130	169	18	160	208	37.5	160
131	20.5	130	170	18.5	160	209	38	160

Table 3 - Utility Specific Poles

Endeavour Energy

Item No.	Type	Pole Length (m)	Ultimate Tip Load (kN)	Pole code on identification plate	Hole-former/ferrule Drawing no.
210	50C	20	40	50C	280236
211			52		
212			60		
213			80		
214			100		
215	50V	21.4	40	50V	288603
216			52		
217			60		
218			80		
219			100		
220	70C	21.4	40	70C	265088
221			52		
222			60		
223			80		
224			100		
225	80C	21.4	40	80C	240257
226			52		
227			60		
228			80		
229			100		
230	60 series	18.5	32	60S	295703
231			40		
232			52		
233			60		
234			80		
235			100		
236		20	32		
237			40		
238			52		
239			60		
240			80		
241			100		
242		21.4	32		
243			40		
244			52		
245			60		
246			80		
247			100		
248		24	32		
249			40		
250			52		
251			60		
252			80		
253			100		
254	70 series	18.5	32	70S	295704
255			40		
256			52		

257			60		
258			80		
259			100		
260		20	32		
261			40		
262			52		
263			60		
264			80		
265			100		
266		21.4	32		
267			40		
268			52		
269			60		
270			80		
271			100		
272		24	32		
273			40		
274			52		
275			60		
276			80		
277			100		
278	80 series	18.5	32	80S	295702
279			40		
280			52		
281			60		
282			80		
283			100		
284		20	32		
285			40		
286			52		
287			60		
288			80		
289			100		
290		21.4	32		
291			40		
292			52		
293			60		
294			80		
295			100		
296		24	32		
297			40		
298			52		
299			60		
300			80		
301			100		
302	33kV Auto Recloser	18.5	40	REC	295244
303			52		
304			60		
305			80		
306			100		
307		20	40		
308			52		
309			60		

310			80		
311			100		
312		21.4	40		
313			52		
314			60		
315			80		
316			100		
317		24	40		
318			52		
319			60		
320			80		
321			100		
322	33kV ABS	18.5	40	ABS	289311
323			52		
324			60		
325			80		
326			100		
327		20	40		
328			52		
329			60		
330			80		
331			100		
332		21.4	40		
333			52		
334			60		
335			80		
336			100		
337		24	40		
338			52		
339			60		
340			80		
341			100		
342	33/66kV Vertical Isolator	24	40	VI	339750
343			52		
344			60		
345			80		
346			100		
347	33kV Termination Structure	12.5	24	H1	56303
348	Stay Pole	10	60	H3	282831
349	M4C	9.5	24	M4	331149
350	M6C	11	24	M6	331149
351	M8C	12.5	16	M8	331149
352	M9C	12.5	24	M9	331149
353	M12C	12.5	40	M12	331149
354	M14C	14	16	M14	331149
355	M15C	14	24	M15	331149
356	Regulator	14	24	REG	316946

Table 4 - Pole / Pile Combinations

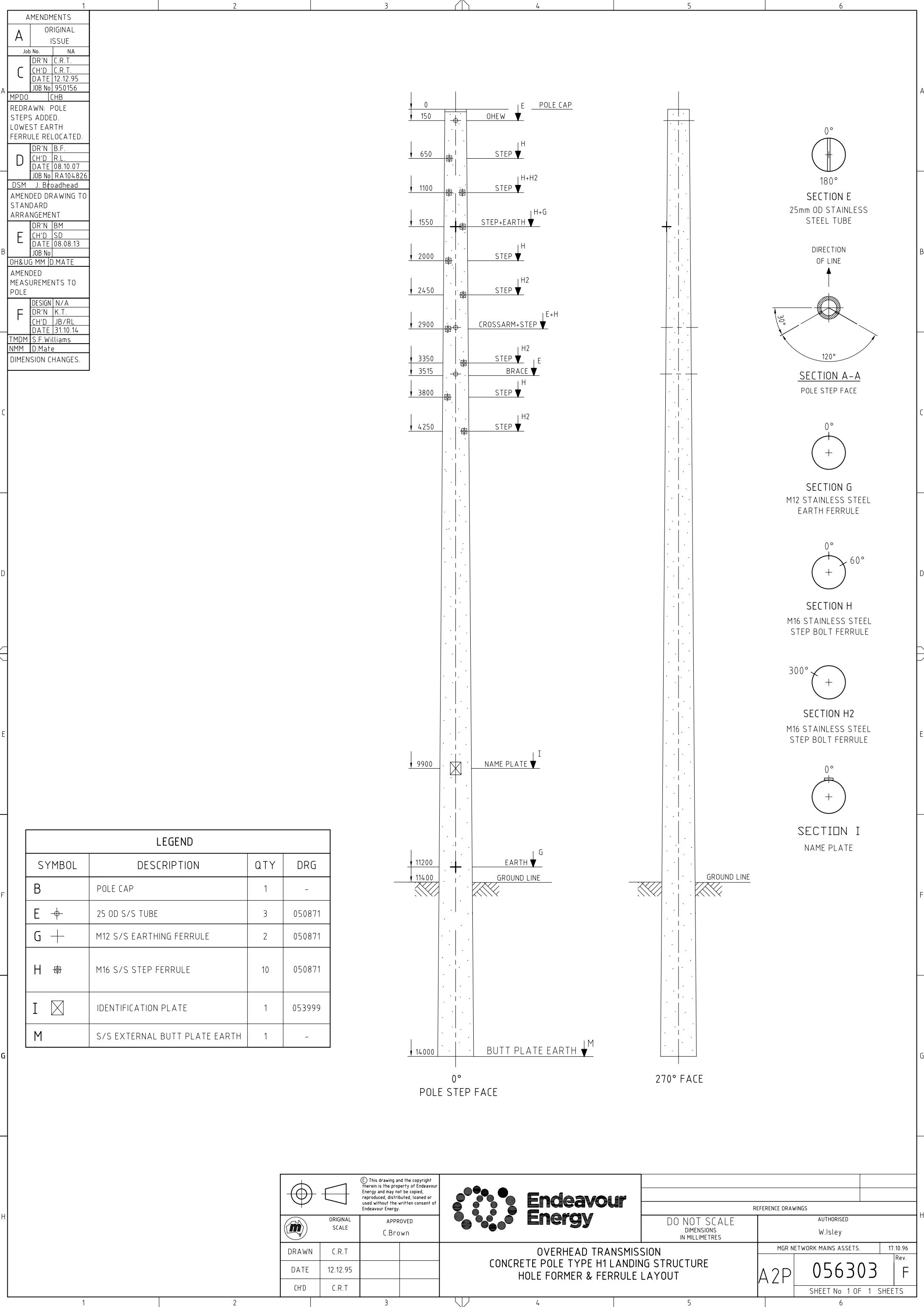
Item No.	Pole/Pile Combination	Item No.	Pole/Pile Combination	Item No.	Pole/Pile Combination
357	12.0m/L/24kN	389	18.0m/L/40kN	421	24.0m/L/80kN
358	12.0m/L/32kN	390	18.0m/L/60kN	422	25.5m/L/32kN
359	12.0m/L/40kN	391	18.0m/L/80kN	423	25.5m/L/40kN
360	12.0m/L/60kN	392	18.0m/L/100kN	424	25.5m/L/60kN
361	12.0m/L/80kN	393	18.0m/L/120kN	425	25.5m/L/80kN
362	12.0m/L/100kN	394	18.0m/L/140kN	426	27.0m/L/32kN
363	12.0m/L/120kN	395	18.0m/L/160kN	427	27.0m/L/40kN
364	12.0m/L/140kN	396	19.5m/L/24kN	428	27.0m/L/60kN
365	12.0m/L/160kN	397	19.5m/L/32kN	429	27.0m/L/80kN
366	13.5m/L/24kN	398	19.5m/L/40kN	430	28.5m/L/40kN
367	13.5m/L/32kN	399	19.5m/L/60kN	431	28.5m/L/60kN
368	13.5m/L/40kN	400	19.5m/L/80kN	432	28.5m/L/80kN
369	13.5m/L/60kN	401	19.5m/L/100kN	433	28.5m/L/100kN
370	13.5m/L/80kN	402	19.5m/L/120kN	434	30.0m/L/40kN
371	13.5m/L/100kN	403	19.5m/L/140kN	435	30.0m/L/60kN
372	13.5m/L/120kN	404	21.0m/L/24kN	436	30.0m/L/80kN
373	15.0m/L/24kN	405	21.0m/L/32kN	437	31.5m/L/40kN
374	15.0m/L/32kN	406	21.0m/L/40kN	438	31.5m/L/60kN
375	15.0m/L/40kN	407	21.0m/L/60kN	439	31.5m/L/80kN
376	15.0m/L/60kN	408	21.0m/L/80kN	440	33.0m/L/40kN
377	15.0m/L/80kN	409	21.0m/L/100kN	441	33.0m/L/60kN
378	15.0m/L/100kN	410	21.0m/L/120kN	442	33.0m/L/80kN
379	15.0m/L/120kN	411	22.5m/L/24kN	443	34.5m/L/40kN
380	16.5m/L/24kN	412	22.5m/L/32kN	444	34.5m/L/60kN
381	16.5m/L/32kN	413	22.5m/L/40kN	445	34.5m/L/80kN
382	16.5m/L/40kN	414	22.5m/L/60kN	446	36.0m/L/40kN
383	16.5m/L/60kN	415	22.5m/L/80kN	447	36.0m/L/60kN
384	16.5m/L/80kN	416	22.5m/L/100kN	448	36.0m/L/80kN
385	16.5m/L/100kN	417	24.0m/L/24kN	449	37.5m/L/40kN
386	16.5m/L/160kN	418	24.0m/L/32kN	450	37.5m/L/60kN
387	18.0m/L/24kN	419	24.0m/L/40kN		
388	18.0m/L/32kN	420	24.0m/L/60kN		

Table 5 -Pole Fittings and Extras

Item No.	Fitting Type
451	Pole Cap (Plain)
452	25mm O.D. Stainless Steel Tube
453	32mm O.D. Stainless Steel Tube
454	M12 Earth Ferrule
455	M12 Stainless Steel Ferrule
456	M16 Earth Ferrule
457	M16 Stainless Steel Step Ferrule
458	M20 Stainless Steel Earth Ferrule
459	0.9mm Stainless Steel Butt Plate with 4 x M16 Earth Ferrules
460	3.0mm Stainless Steel Butt Plate with 4 x M16 Earth Ferrules
461	5.0mm Stainless Steel Butt Plate with 4 x M16 Earth Ferrules
462	44 O.D. Stainless Steel Tube Wall Thickness
463	50 O.D. Stainless Steel Tube Wall Thickness
464	76 O.D. Stainless Steel Tube Wall Thickness
465	600x300 Wide Cutout
466	450x300 Wide Cutout
467	400x150 Wide Cutout
468	280x100 (ID) Hatch Door
469	150x75 45degree Cable Exit Slot
470	50mm Stainless Steel Drain Hole
471	Name Plate
472	Depth Indication Mark
473	Marine Environment Service Conditions (DCI Corrosion Inhibitor)
474	Painting
475	Pile Orientation Mark, from toe to ground level, to ensure pile alignment

10.0 REVISIONS

Issue Number	Clause	Details of Changes in this Revision



AMENDMENTS		
A	ORIGINAL	ISSUE
Job No. NA		
C	DR'N	C.R.T.
	CH'D	C.R.T.
	DATE	12.12.95
	JOB No	950156
MPDO CHB		
REDRAWN: POLE STEPS ADDED. LOWEST EARTH FERRULE RELOCATED.		
D	DR'N	B.F.
	CH'D	R.L.
	DATE	08.10.07
	JOB No	RA104826
DSM J. Broadhead		
AMENDED DRAWING TO STANDARD ARRANGEMENT		
E	DR'N	BM
	CH'D	SD
	DATE	08.08.13
	JOB No	
OH&UG MM D.MATE		
AMENDED MEASUREMENTS TO POLE		
F	DESIGN	N/A
	DR'N	K.T.
	CH'D	JB/RL
	DATE	31.10.14
TMDM S.F.Williams		
NMM D.Mate		
DIMENSION CHANGES.		

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ORIGINAL SCALE

APPROVED
C.Brown

DRAWN

DATE

CH'D

C.R.T.

DO NOT SCALE
DIMENSIONS
IN MILLIMETRES

OVERHEAD TRANSMISSION
CONCRETE POLE TYPE H1 LANDING STRUCTURE
HOLE FORMER & FERRULE LAYOUT

REFERENCE DRAWINGS

AUTHORISED
W.Isley

MGR NETWORK MAINS ASSETS.

17.10.96

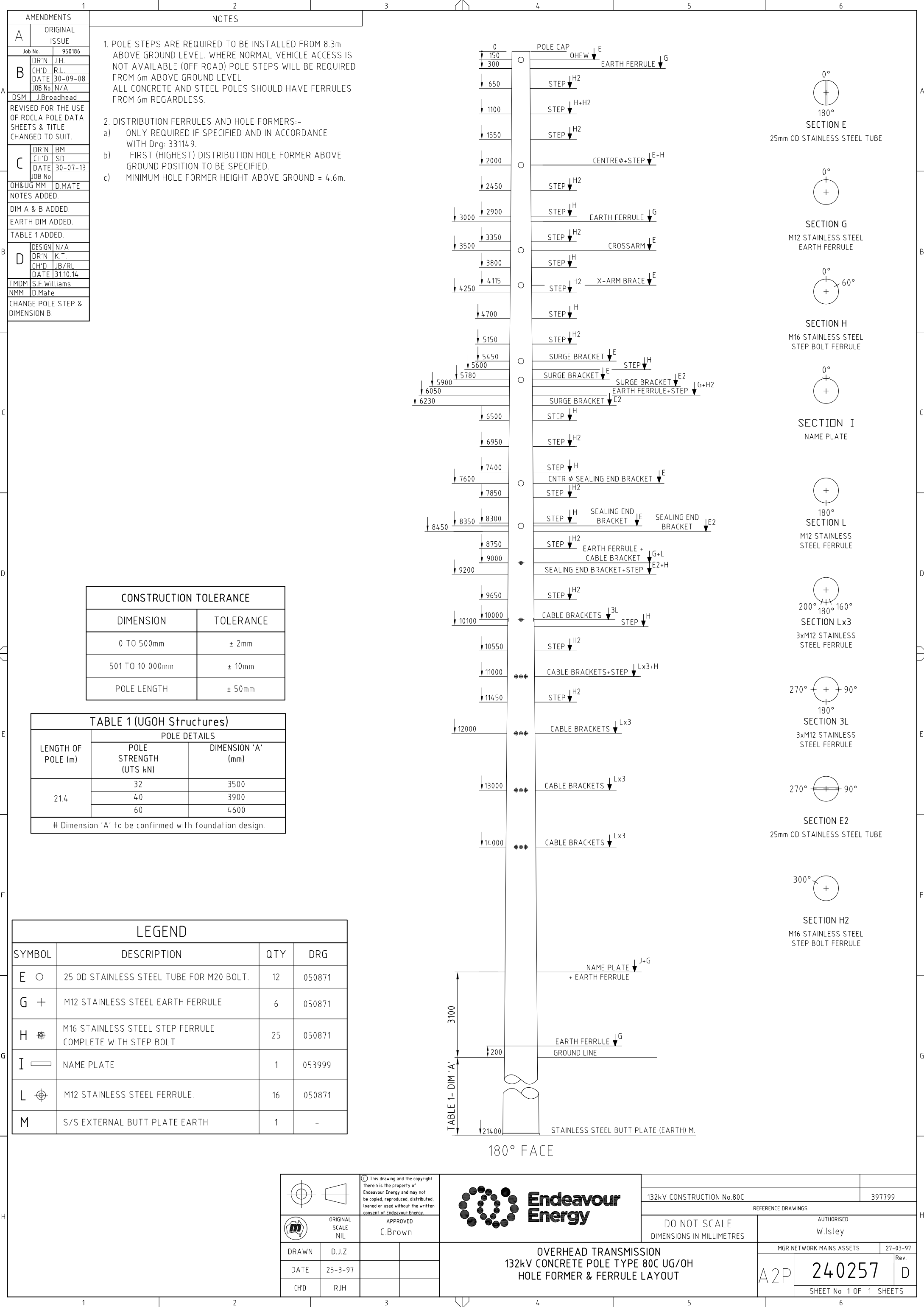
Rev.

F

A2P

056303

SHEET No 1 OF 1 SHEETS



AMENDMENTS	
A	ORIGINAL ISSUE
Job No.	
B	DR'N F.M.
	CH'D R.L.
	DATE 21/8/03
	JOB No BTE3004A
TMM	C.H.B.
SECTION U-U ADDED. CABLE SLOT QTY WAS '3'.	
C	DR'N BF
	CH'D RL
	DATE 07.09.06
	JOB No RA104626
DSM	CB
REDRAWN, GENERAL REVISION	
D	DR'N BF
	CH'D R.L.
	DATE 03.08.07
	JOB No RA104626
DSM	J. Broadhead
SECTION M-M DELETED	
E	DR'N BM
	CH'D SD
	DATE 30-07-13
	JOB No
OH&UG MM D.MATE	
SECTION A-A DELETED.	
CABLE SLOT DETAIL DELETED	
CABLE SLOT DELETED.	
DIM A & B ADDED.	
EARTH DIM ADDED.	
TABLE 1 ADDED.	
F	DESIGN N/A
	DR'N K.T.
	CH'D JB/RL
	DATE 31.10.14
TMDM	S.F.Williams
NMM	D.Mate
TABLE & POLE SECTION REVISED.	

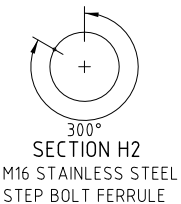
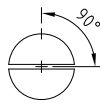
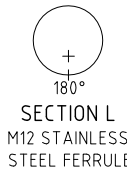
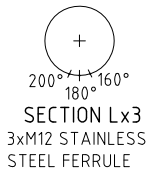
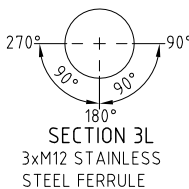
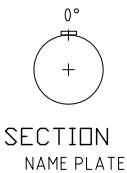
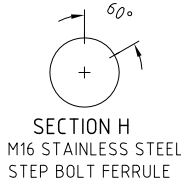
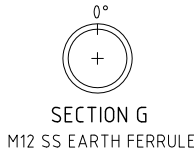
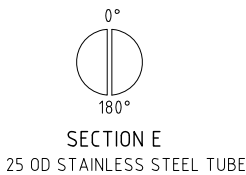
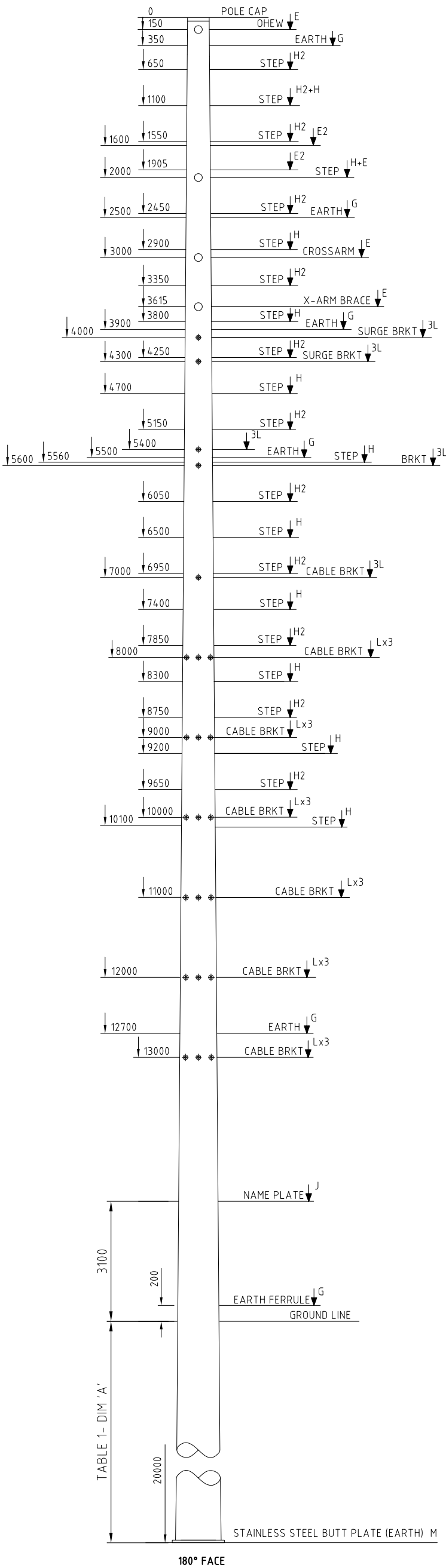
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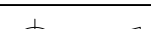
1. POLE STEPS ARE REQUIRED TO BE INSTALLED FROM 8.3m ABOVE GROUND LEVEL. WHERE NORMAL VEHICLE ACCESS IS NOT AVAILABLE (OFF ROAD) POLE STEPS WILL BE REQUIRED FROM 6m ABOVE GROUND LEVEL.
ALL CONCRETE AND STEEL POLES SHOULD HAVE FERRULES FROM 6m REGARDLESS.
2. DISTRIBUTION FERRULES AND HOLE FORMERS:-
 - a) ONLY REQUIRED IF SPECIFIED AND IN ACCORDANCE WITH Drg- 331149.
 - b) FIRST (HIGHEST) DISTRIBUTION HOLE FORMER ABOVE GROUND POSITION TO BE SPECIFIED.
 - c) MINIMUM HOLE FORMER HEIGHT ABOVE GROUND = 4.6m.

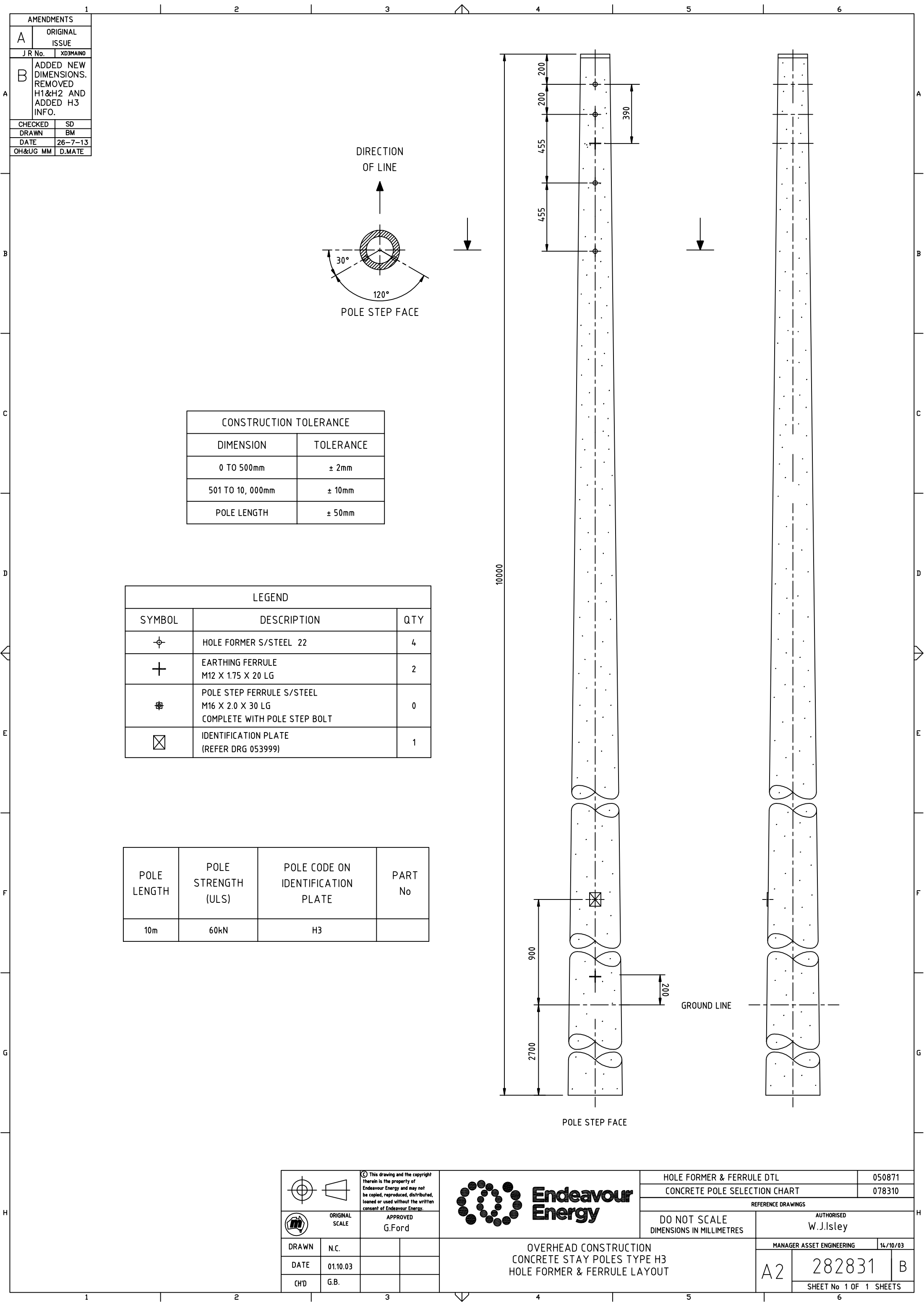
CONSTRUCTION TOLERANCE	
DIMENSION	TOLERANCE
0 TO 500mm	± 2mm
501 TO 10 000mm	± 10mm
POLE LENGTH	± 50mm

LENGTH OF POLE (m)	POLE DETAILS	
	POLE STRENGTH (UTS kN)	DIMENSION 'A' (mm)
20	32	3400
	40	3800
	60	4400
# Dimension 'A' to be confirmed with foundation design.		

LEGEND			
SYMBOL	DESCRIPTION	QTY	DRG
E 	25 OD STAINLESS STEEL TUBE	6	050871
G 	M12 STAINLESS STEEL EARTH FERRULE	6	050871
H 	M16 STAINLESS STEEL STEP FERRULE COMPLETE WITH STEP BOLT	22	050871
I 	NAME PLATE	1	053999
L 	M12 STAINLESS STEEL FERRULE.	33	050871
M	S/S EXTERNAL BUTT PLATE EARTH	1	-



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		ORIGINAL SCALE NIL		APPROVED K. Oliver		REFERENCE DRAWINGS			
DRAWN N.C.				OVERHEAD TRANSMISSION 33kV CONCRETE POLE TYPE 50C UG/OH HOLE FORMER & FERRULE LAYOUT		DO NOT SCALE DIMENSIONS IN MILLIMETRES		AUTHORISED D. Asvestas / C. Brown	
DATE 07.07.03						MGR TRANSMISSION CAPITAL PROJECTS		12.08.03	
CHD R.L.						A2P		280236	
								Rev. F	
								SHEET No 1 OF 1 SHEETS	

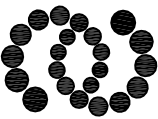


AMENDMENTS	
A	ORIGINAL ISSUE
J R No.	XD3MAINO
B	ADDED NEW DIMENSIONS. REMOVED H1&H2 AND ADDED H3 INFO.
CHECKED	SD
DRAWN	BM
DATE	26-7-13
OH&UG MM	D.MATE

CONSTRUCTION TOLERANCE	
DIMENSION	TOLERANCE
0 TO 500mm	± 2mm
501 TO 10, 000mm	± 10mm
POLE LENGTH	± 50mm

LEGEND		
SYMBOL	DESCRIPTION	QTY
	HOLE FORMER S/STEEL 22	4
	EARTHING FERRULE M12 X 1.75 X 20 LG	2
	POLE STEP FERRULE S/STEEL M16 X 2.0 X 30 LG COMPLETE WITH POLE STEP BOLT	0
	IDENTIFICATION PLATE (REFER DRG 053999)	1

POLE LENGTH	POLE STRENGTH (ULS)	POLE CODE ON IDENTIFICATION PLATE	PART No
10m	60kN	H3	



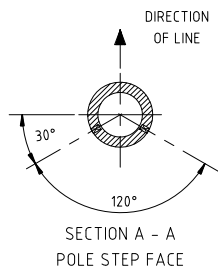
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APPROVED
G.Ford

HOLE FORMER & FERRULE DTL		050871	
CONCRETE POLE SELECTION CHART		078310	
DO NOT SCALE DIMENSIONS IN MILLIMETRES		AUTHORISED W.J.Isley	
OVERHEAD CONSTRUCTION CONCRETE STAY POLES TYPE H3 HOLE FORMER & FERRULE LAYOUT		MANAGER ASSET ENGINEERING	
		14/10/03	
A2		282831	B
SHEET No 1 OF 1 SHEETS			

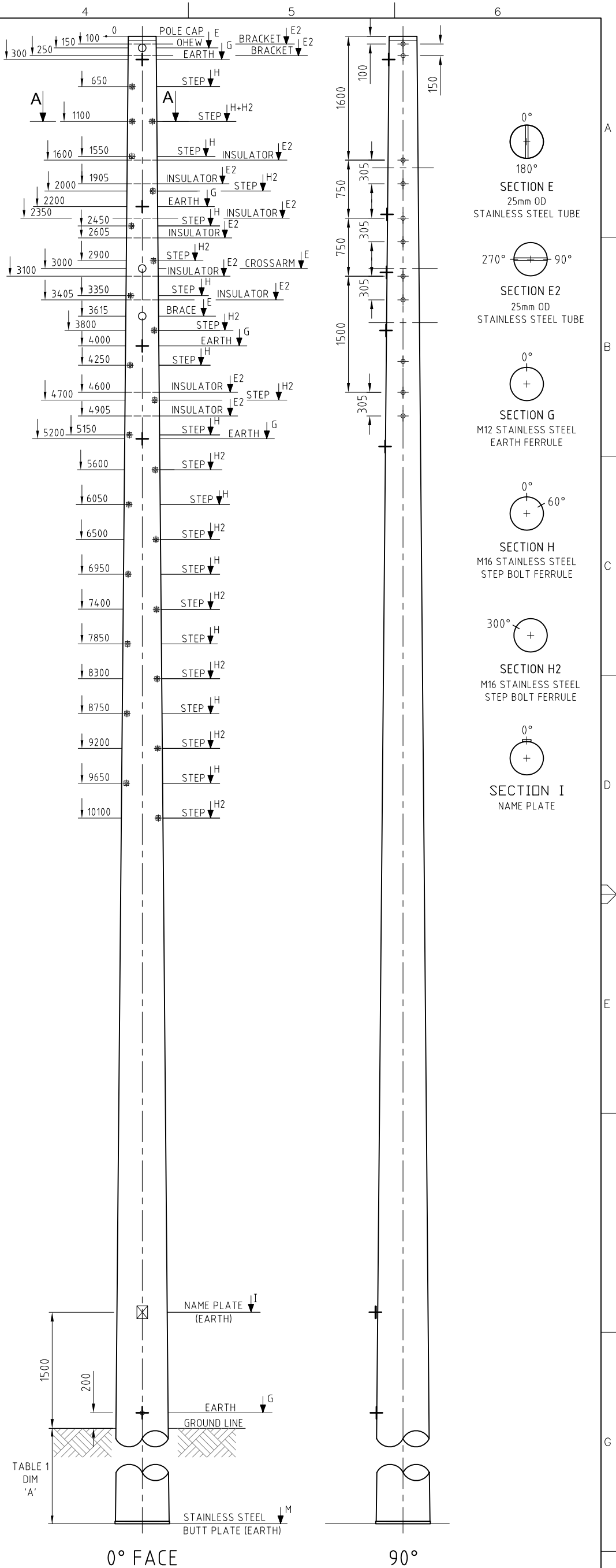
AMENDMENTS	
A	ORIGINAL ISSUE
	Job No. 950156
B	DR'N B.F.
	CH'D M.C.
	DATE 30 09 09
	JOB No CA104907
DSM J.F. Broadhead	
NOTE 1 REF DRG WAS 240382	
C	DR'N BM
	CH'D SD
	DATE 30-07-13
	JOB No
OH&UG MM D.MATE	
NOTES ADDED	
DIM A & B ADDED.	
EARTH DIM ADDED.	
TABLE 1 ADDED.	
D	DESIGN N/A
	DR'N K.T.
	CH'D JB/RL
	DATE 31.10.14
TMDM S.F.Williams	
NMM D.Mate	
TABLE & POLE SECTION REVISED.	

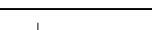
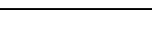


CONSTRUCTION TOLERANCE	
DIMENSION	TOLERANCE
0 TO 500mm	± 2mm
501 TO 10 000mm	± 10mm
POLE LENGTH	± 50mm

TABLE 1			
LENGTH OF POLE (m)	QTY OF POLE STEP FERRULES	POLE DETAILS	
		POLE STRENGTH (UTS kN)	DIMENSION 'A' (mm)
18.5	25	32	3200
		40	3600
		60	4200
20	28	32	3400
		40	3800
		60	4400
21.4	32	32	3500
		40	3900
		60	4600
23	35	32	3600
		40	4100
		60	4700
24	37	32	3700
		40	4200
		60	4800
# Dimension 'A' to be confirmed with foundation design.			

LEGEND			
SYMBOL	DESCRIPTION	QTY	DRG
B 	POLE CAP	1	-
E 	25 OD S/S TUBE	13	050871
G 	M12 S/S EARTHING FERRULE	5	050871
H 	M16 S/S STEP FERRULE	REFER TABLE ABOVE	050871
I 	IDENTIFICATION PLATE	1	053999
M 	S/S EXTERNAL BUTT PLATE EARTH	1	-

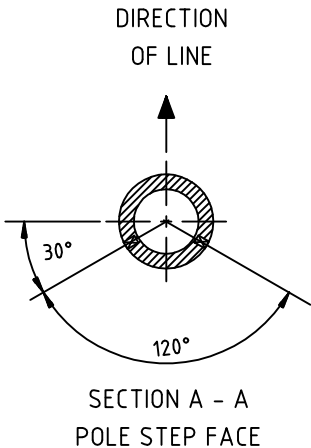


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 ORIGINAL SCALE		APPROVED G.HAYDON				DO NOT SCALE DIMENSIONS IN MILLIMETRES		REFERENCE DRAWINGS AUTHORISED D.ASVESTAS/C.BROWN			
DRAWN TC				OVERHEAD TRANSMISSION 33/66kV CONCRETE POLE TYPE '60 SERIES' HOLE FORMER & FERRULE LAYOUT		MGR TRANSMISSION CAPITAL PROJECTS		01/08/05			
DATE 18/5/05						A2P		295703		D	
CH'D RL 1/8/05								SHEET No 1 OF 1 SHEETS			

H

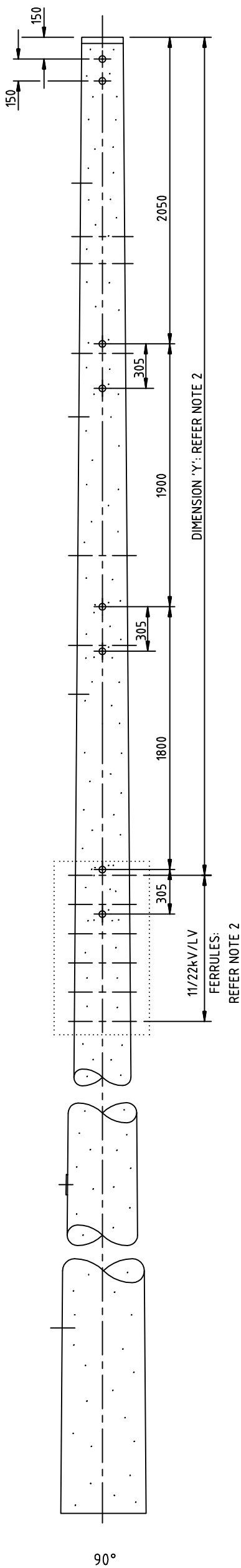
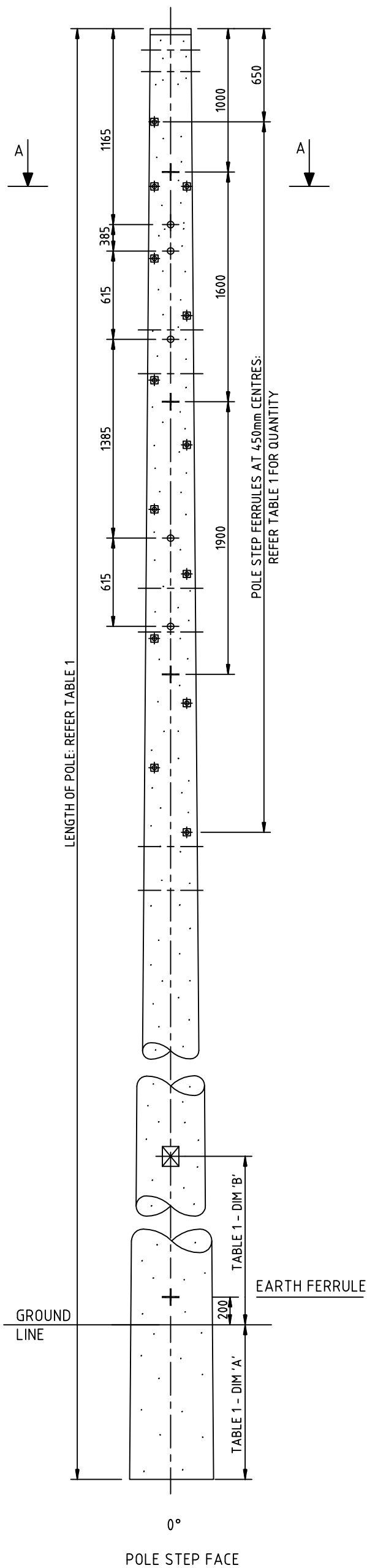
3. HOLE FORMERS & FERRULES TO SUIT CONSTRUCTIONS
71C, 72C, 73C, 74C, 75C, 76C, 77C, 78C AND 78X.

CONSTRUCTION TOLERANCE	
DIMENSION	TOLERANCE
0 TO 500mm	± 2mm
501 TO 10 000mm	± 10mm
POLE LENGTH	± 50mm

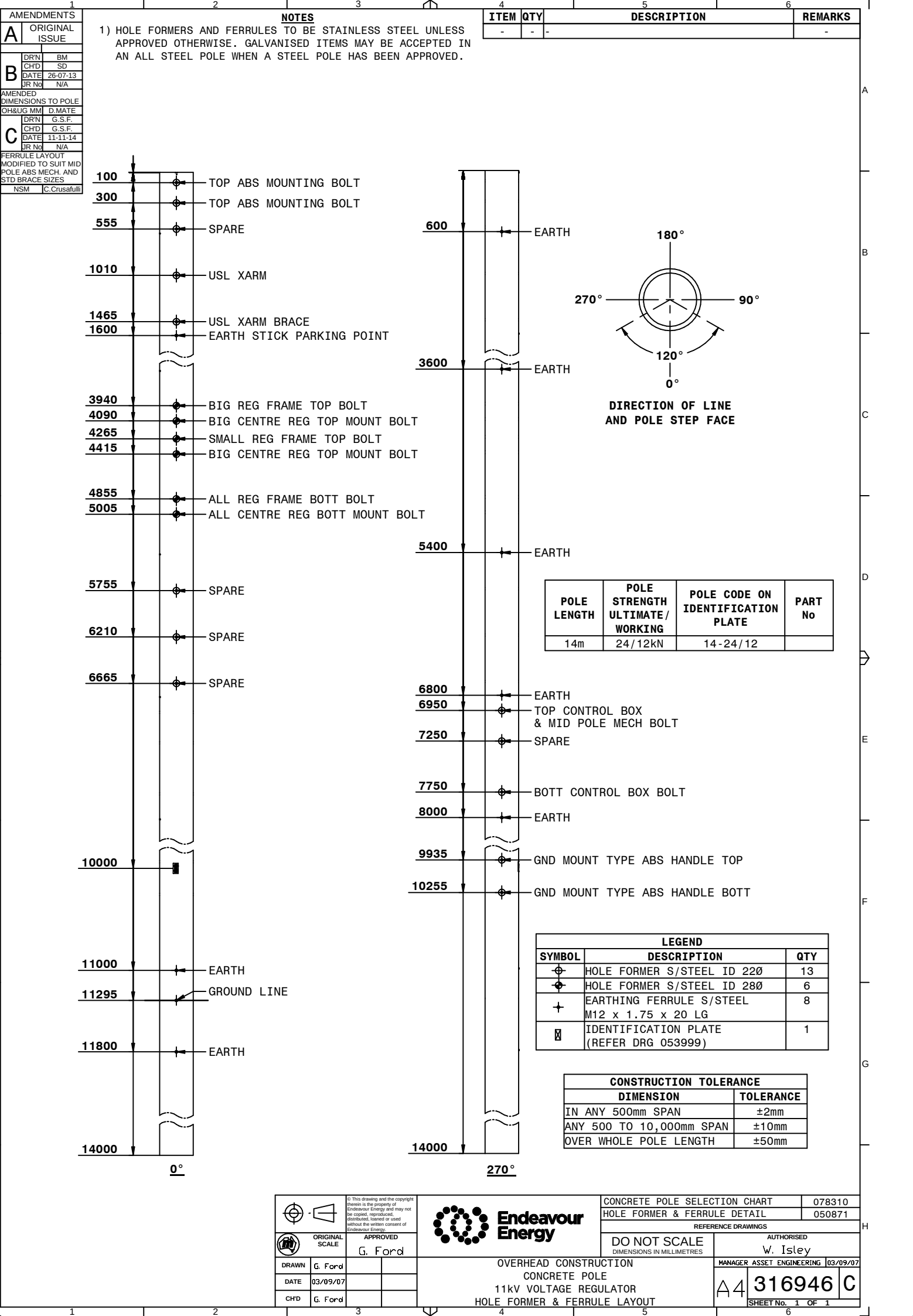


LENGTH OF POLE (m)	QTY OF POLE STEP FERRULES	POLE DETAILS		
		POLE STRENGTH (ULS kN)	DIMENSION 'A' (mm)	DIMENSION 'B' (mm)
18.5	25	32	2900	1550
		40	3100	1350
		52	3400	1050
		60	3700	750
		80	#	#
		100	#	#
20	28	32	3000	1600
		40	3200	1400
		52	3500	1100
		60	3900	700
		80	#	#
		100	#	#
21.4	32	32	3000	1740
		40	3200	1540
		52	3700	1040
		60	3800	940
		80	#	#
		100	#	#
24	37	32	3100	1900
		40	3600	1400
		52	3800	1200
		60	4100	900
		80	#	#
		100	#	#
Pole nameplate dimension " B " = $2600 + (\text{Pole Length} \times 100) - \text{Buried Depth}$ "A". # Dimension 'A' & 'B' to be advised following foundation design.				

LEGEND			
SYMBOL	DESCRIPTION	QTY	DRG
	HOLE FORMMER Ø25	13	050871
	EARTHING FERRULE M12 X 1.75	4	050871
	POLE STEP FERRULE M16 X 2.0 : COMPLETE WITH POLE STEP BOLT	REFER TABLE ABOVE	050871 050879
	IDENTIFICATION PLATE	1	053999



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		ORIGINAL SCALE		APPROVED G.HAYDON		REFERENCE DRAWINGS	
		DO NOT SCALE DIMENSIONS IN MILLIMETRES		AUTHORISED D.ASVETAS/C.BROWN		H	
DRAWN T.C		DATE 19-05-05		OVERHEAD TRANSMISSION 66kV CONCRETE POLE TYPE '70 SERIES' HOLE FORMER & FERRULE LAYOUT		MGR TRANSMISSION CAPITAL PROJECTS 01/08/05	
CH'D R.L 1/8/05		A2		295704		c	
				SHEET No 1 OF 1 SHEETS			



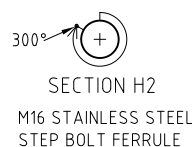
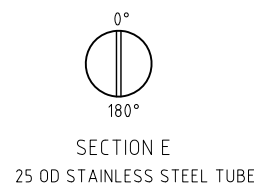
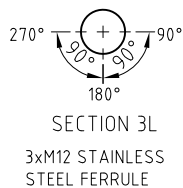
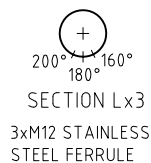
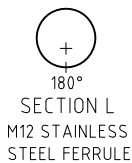
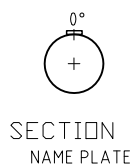
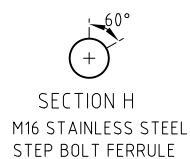
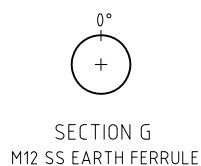
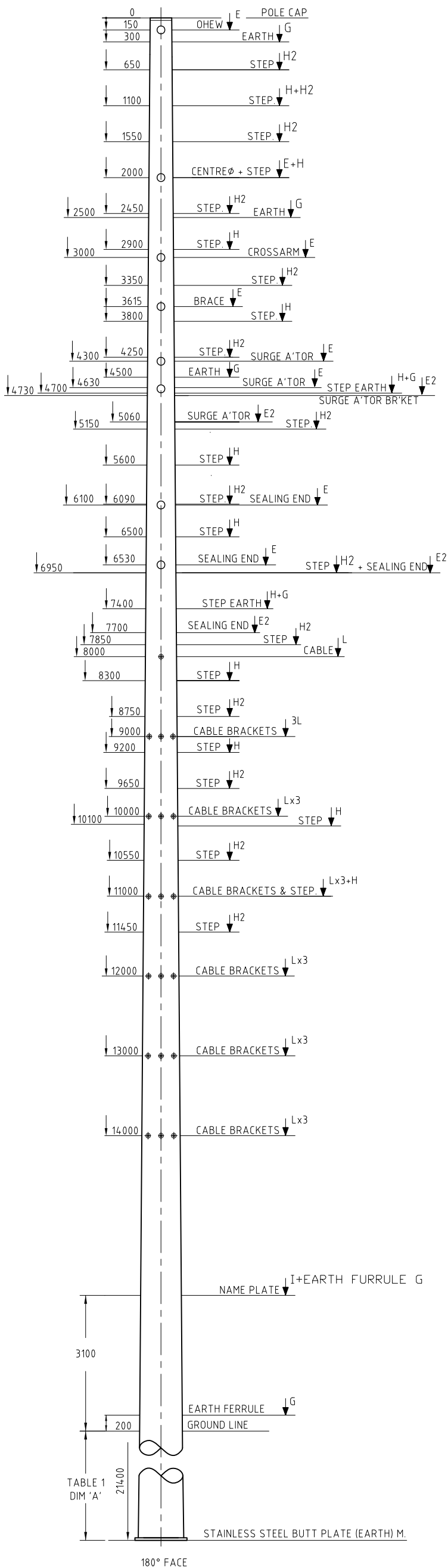
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DO NOT SCALE		AUTHORISED	
DIMENSIONS IN MILLIMETERS		W. Isley	
INSTRUCTION		MANAGER ASSET ENGINEERING 16/12/08	
PRE-DRILLED POLE		331149	
LAYOUT		D	
		SHEET No. 1 OF 1	

		1	2	3
AMENDMENTS		NOTES		
A	ORIGINAL ISSUE	1. POLE STEPS ARE REQUIRED TO BE INSTALLED FROM 8.3m ABOVE GROUND LEVEL. WHERE NORMAL VEHICLE ACCESS IS NOT AVAILABLE (OFF ROAD) POLE STEPS WILL BE REQUIRED FROM 6m ABOVE GROUND LEVEL. ALL CONCRETE AND STEEL POLES SHOULD HAVE FERRULES FROM 6m REGARDLESS.		
Job No.	WTE1406			

TABLE 1		
LENGTH OF POLE (m)	POLE DETAILS	
	POLE STRENGTH (UTS kN)	DIMENSION 'A' (mm)
21.4	32	3500
	40	3900
	60	4600
# Dimension 'A' to be confirmed with foundation design.		

CONSTRUCTION TOLERANCE	
DIMENSION	TOLERANCE
0 TO 500mm	± 2mm
501 TO 10 000mm	± 10mm
POLE LENGTH	± 50mm

LEGEND			
DRG#	SYMBOL	DESCRIPTION	QTY
050871	E ○	25 OD S/S TUBE	12
050871	G +	M12 STAINLESS STEEL EARTH FERRULE	6
050871	H	M16 STAINLESS STEEL STEP FERRULE	25
053999	I 	NAME PLATE	1
050871	L ⊕	M12 STAINLESS STEEL FERRULE.	22
050871	M	S/S EXTERNAL BUTT PLATE EARTH	1



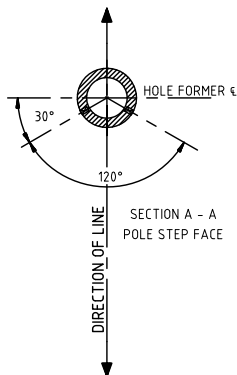
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	ORIGINAL SCALE NTS	APPROVED S.F. Williams	
DRAWN	KT		
DATE	17.10.14		
CH'D	JB/RL		



IDENTIFICATION PLATE		053999	
HOLE FORMER & FERRULE		050871	
REFERENCE DRAWINGS			
DO NOT SCALE DIMENSIONS IN MILLIMETRES		AUTHORISED D.Mate	
SION 60C UG/0H LAYOUT		NETWORK MAINS MANAGER	
		31.10.14	
		Rev.	
A2P		344474	
		A	
		SHEET No 1 OF 1 SHEETS	

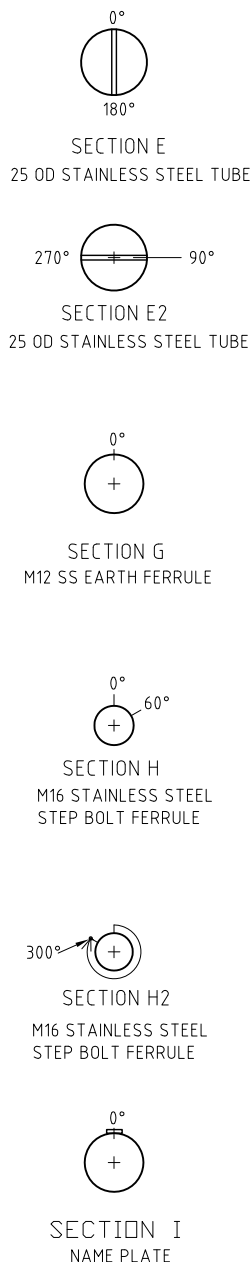
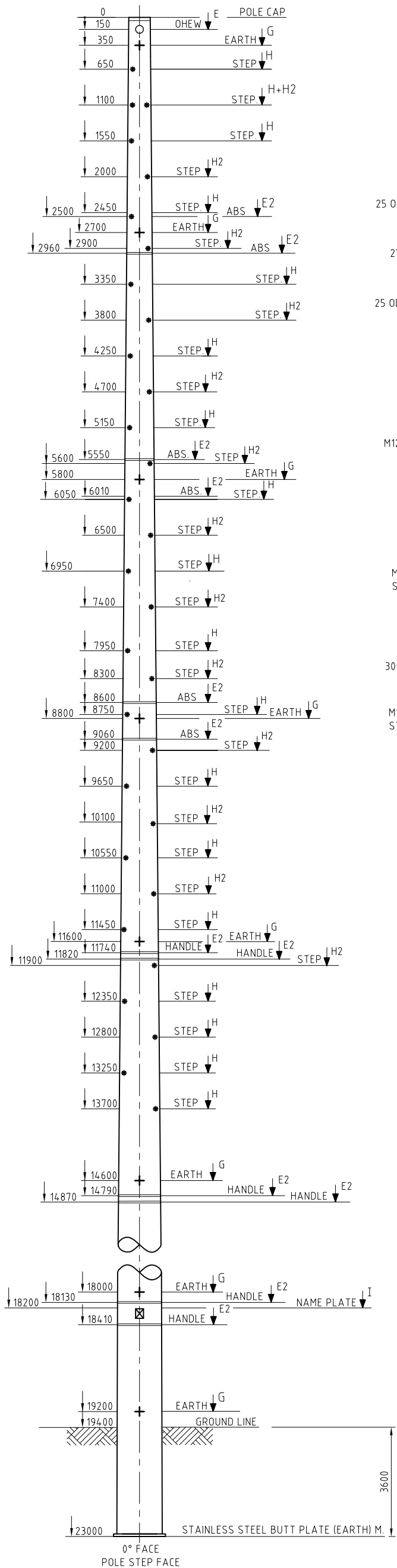
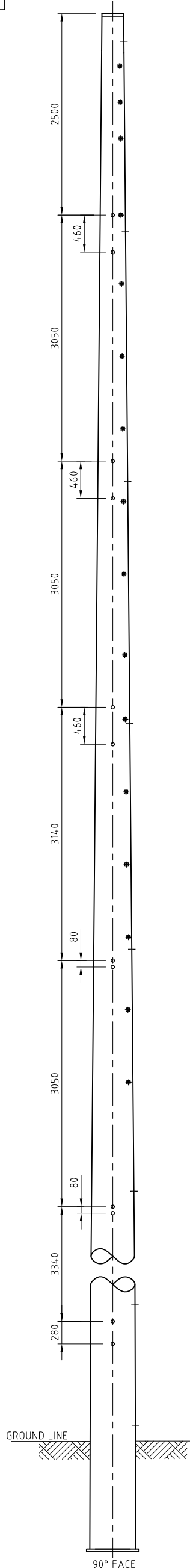
1		2		3	
AMENDMENTS		NOTES			
A	ORIGINAL ISSUE	1. POLE STEPS ARE REQUIRED TO BE INSTALLED FROM 8.3m ABOVE GROUND LEVEL. WHERE NORMAL VEHICLE ACCESS IS NOT			
Job No.	WTE1406				

1. POLE STEPS ARE REQUIRED TO BE INSTALLED FROM 8.3m ABOVE GROUND LEVEL. WHERE NORMAL VEHICLE ACCESS IS NOT AVAILABLE (OFF ROAD) POLE STEPS WILL BE REQUIRED FROM 6m ABOVE GROUND LEVEL.
ALL CONCRETE AND STEEL POLES SHOULD HAVE FERRULES FROM 6m REGARDLESS.



CONSTRUCTION TOLERANCE	
DIMENSION	TOLERANCE
0 TO 500mm	± 2mm
501 TO 10 000mm	± 10mm
POLE LENGTH	± 50mm

LEGEND			
SYMBOL	DESCRIPTION	QTY	DRG
B 	POLE CAP	1	-
E 	HOLE FORMER Ø25	13	050871
G 	M12 S/S EARTHING FERRULE	8	050871
H 	M16 S/S POLE STEP FERRULE	31	050871
I 	IDENTIFICATION PLATE	1	053999
M 	S/S EXTERNAL BUTT PLACE EARTH	1	-



		33/66kV VERTICAL ISOL.CONSTRUCTION		398006	
DO NOT SCALE DIMENSIONS IN MILLIMETRES		REFERENCE DRAWINGS			
AUTHOURISED D.Mate		AUTHOURISED D.Mate			
DRAWN KT		DATE 20.10.14		CH'D J.B./R.L.	
ORIGINAL SCALE N.T.S		APPROVED S.F.Williams		OVERHEAD TRANSMISSION 33/66kV CONCRETE POLE TYPE LOAD BREAK SWITCH HOLE FORMER & FERRULE LAYOUT	
NETWORK MAINS MANAGER		31.10.14		Rev. A	
A2P		353213		SHEET No 1 OF 1 SHEETS	

