WT15000
on TM1500

PROVEN
PROVEN ENERGY

Foundation Pack

SCOTTISH renewables
The Forum for Scotland's Renewable Energy Industry

Energy Saving Trust

THE BRITISH WIND ENERGY ASSOCIATION

clearskies
RENEWABLE ENERGY GRANTS

INSTALLER ACCREDITION NUMBER: 2118497

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Foundation Pack for WT15000/TM1500

LIST OF PARTS TO BE SENT WITH BASE PLATE

1 - GALVANISED STEEL BASE PLATE

10 - M36 BZP HIGH TENSILE (HT) FOUNDATION RODS WITH EXTENSION BOSSES.

10 – M36x100 BZP HIGH TENSILE BOLTS AND 10 WASHERS

10 – SPACER TUBE PIECES FOR INITIAL USE WITH M36X100 HT BOLTS
(25mm IN LENGTH)

6 - M30 BZP HT FOUNDATION RODS WITH EXTENSION BOSSES FITTED

6 – M30x60 HIGH TENSILE BOLTS AND 6 WASHERS

1 – 40 mm DIAMETER ANCHOR HAIRPIN

1 set Foundation Pack

- 1 Pack Description (this page)
- 1 Standard foundation diagram
- 1 Anchor foundation diagram
- 1 Foundation description (incl. concrete mixing details)

N.B. REINFORCING STEEL MESH SHEET IS ALSO REQUIRED FOR THE FOUNDATION WORK BUT IS NOT INCLUDED IN THE KIT SUPPLIED BY PROVEN

PROVEN WT15000/TM1500 MAST

FOUNDATION PREPARATIONS

The main foundation consists of a large block of high-strength concrete. Sixteen High Tensile (HT) steel foundation rods are set into the concrete and are attached to and through the Foundation Base Plate. The Base Plate includes the hinge-pin attachment, which is used to raise and lower the turbine (see diagrams). Preferably, the concrete should be prepared and the foundation prepared with one load of concrete. Where this is not possible, the top layer should be added before the bottom one has had time to set.

Important

Before setting the Base Plate and foundations into the concrete foundation consider which way your WT will be lowered/raised and position the hinge-pin accordingly

Don't 'Shutter & Backfill'

When preparing house foundations a mould is prepared into which the concrete is poured. Earth/rocks are then filled around the foundation after the concrete has set.

For WT foundations it is better to have an irregular shaped foundation than to have a perfect cube and then surround it with loose earth - just dig a hole and then fill it! This will produce a foundation with good stability.

Preparing the Base Foundation

The base foundation consists of approximately 16.5m^3 of strong-mix concrete (35 Newton). Normally this is prepared as a rough 3.7 x 3.7 x 1.2m cube, but where ground conditions dictate, a shallower wider foundation of the same volume may be used. As and when required soil analysis can be conducted to identify exactly what type and dimension of foundations are to be used in certain ground-types. Proven Energy Ltd. can provide basic information to give an idea as to what is required, however professional advice should be sought when an exact soil analysis is required.

Assembling the steelwork

With each foundation kit there are 6 M30 x 60 mm HT bolts, 6 M30 x 1000 mm foundation rods, 10 M36 x 100 mm HT bolts and 10 M36 x 1000 mm foundation rods, 1 base plate and a 40mm diameter anchor hairpin. **Steel reinforcing mesh is also required but not supplied**.

Refer to the assembly step diagrams for further details.
Insert mesh into foundation hole, the foundation rods will have to be fed through this before connecting to the foundation plate. Screw the 10 M30x100mm bolts into the foundation rod extension bosses through the 10 holes in a circular pattern in the middle of the base plate. These bolts will later be withdrawn and used to bolt the WT tower to the base plate, once concrete has cured. It is therefore necessary to place a 25mm spacer tube under the head of each bolt. Tighten bolts till the bosses are tight against the underside of the base plate.
Insert conduit or soil pipe, as shown, this is used for wind turbine power cable from edge of hole up through centre of base plate
Similarly fit the remaining 6 foundations rods to the outer 6 holes around the edge of the plate.

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Screw the 6 M30x60mm bolts into the foundation rod extension bosses; again tighten until the bosses are tight against the underside of the base plate. No spacers are required for these outer 6 bolts.

Finally and most importantly make sure that base plate is completely level.
Add concrete (Readymix supplier is usually easiest for this type of volume) and use vibrating concrete poker as necessary to remove air bubbles.
Make sure that base plate is fully supported underneath by concrete.

Clean the base plate of any excess concrete.

Winch Anchor Foundation

Refer to foundation diagrams for positioning. The anchor consists of a 1.5m x 1.5m x 1.2m cube or equivalent. It should be located on the opposite side of the base plate to the hinge pin attachment. **N.B. It is important that the anchor is placed exactly in line with the centre of the base plate and perpendicular to the line of the hinge brackets.**

Concrete Specification

If using a Readymix supplier, ask for 35 Newton concrete. If mixing the concrete yourself, you should use the following proportions by volume

1:2:4
cement:sand:gravel

Approximate volumes and weights for a $1m^3$ foundation are

Cement:	310kg or 6.2 bags	(1 bag = 50kg)
Sand:	$0.43m^3$	(967 kg or approx 1.0 tonnes)
Gravel:	$0.86m^3$	(2150kg or approx 2.2 tonnes)

Hardening Time

You should allow plenty of time for the foundation to set and harden fully before erecting the turbine. We recommend a hardening period of approximately 2 weeks. For this reason, foundations are normally prepared in advance of the main installation. Note that the hardening time may be lengthened by poor weather conditions and shortened by the use of a quick-setting concrete additive.

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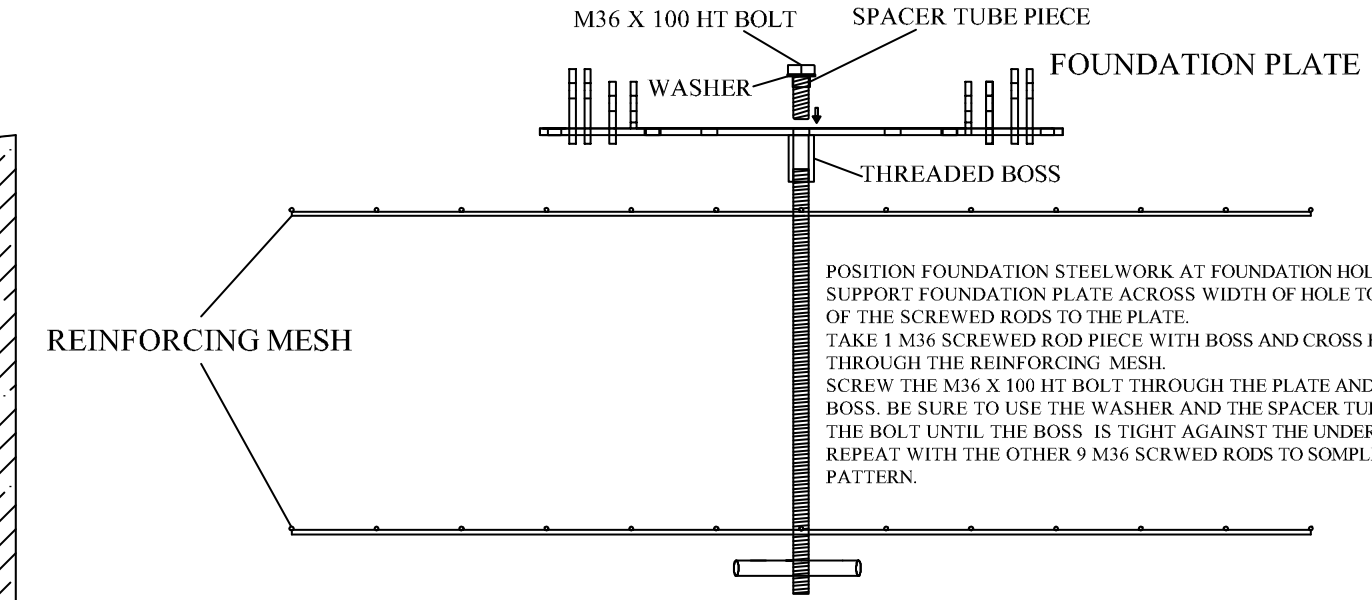
1



POSITION FOUNDATION STEELWORK AT FOUNDATION HOLE.
SUPPORT FOUNDATION PLATE ACROSS WIDTH OF HOLE TO ALLOW BOLTING OF THE SCREWED RODS TO THE PLATE.
TAKE 1 M36 SCREWED ROD PIECE WITH BOSS AND CROSS BAR AND FEED THIS THROUGH THE REINFORCING MESH.
SCREW THE M36 X 100 HT BOLT THROUGH THE PLATE AND INTO THE TAPPED BOSS. BE SURE TO USE THE WASHER AND THE SPACER TUBE PIECE. TIGHTEN THE BOLT UNTIL THE BOSS IS TIGHT AGAINST THE UNDERSIDE OF THE PLATE.
REPEAT WITH THE OTHER 9 M36 SCRWED RODS TO SOMPLETE THE CIRCULAR PATTERN.

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SCALE	DATE 13/04/04	SHEET sheet	

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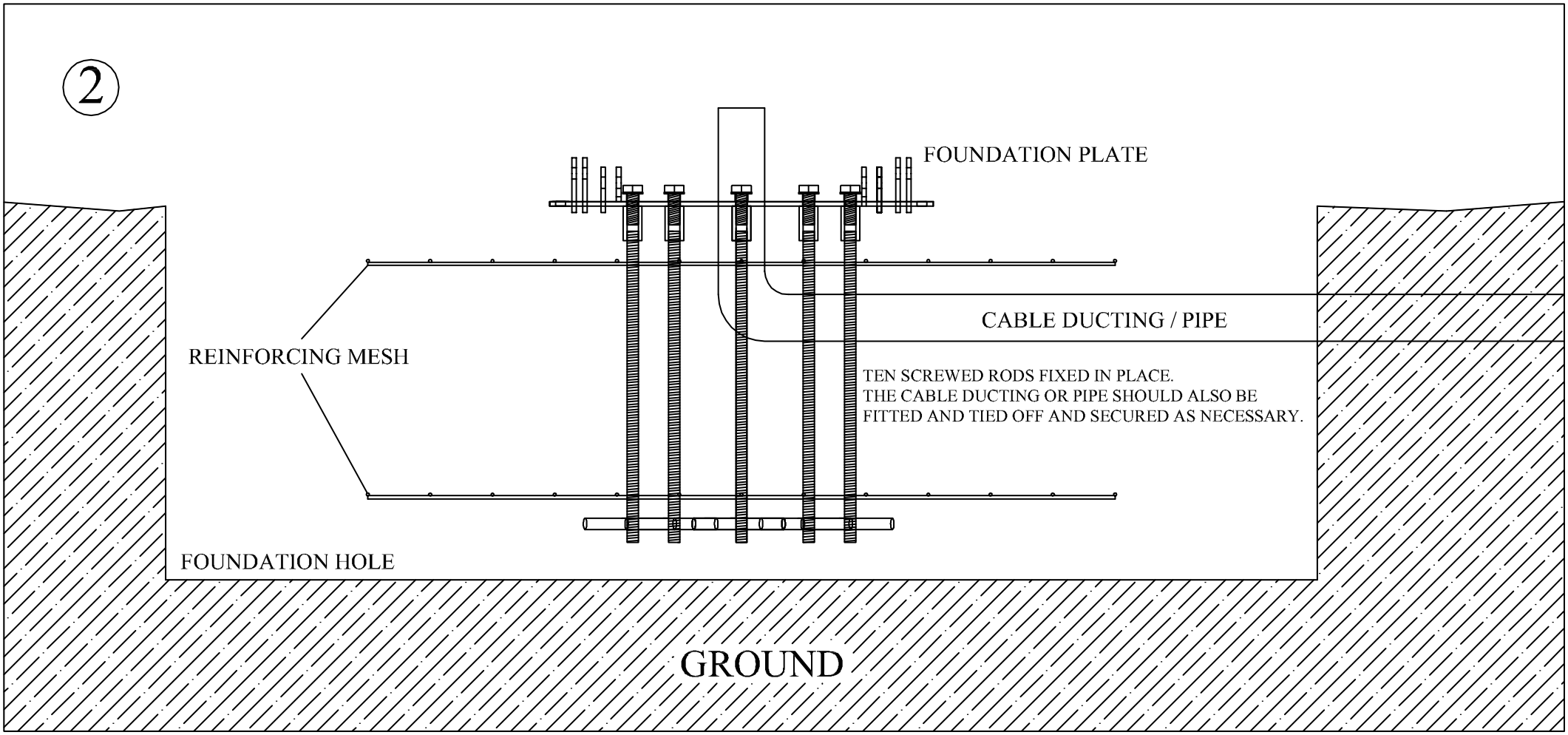
Drawing Title
15kW ASSEMBLY STEPS NO. 1

2



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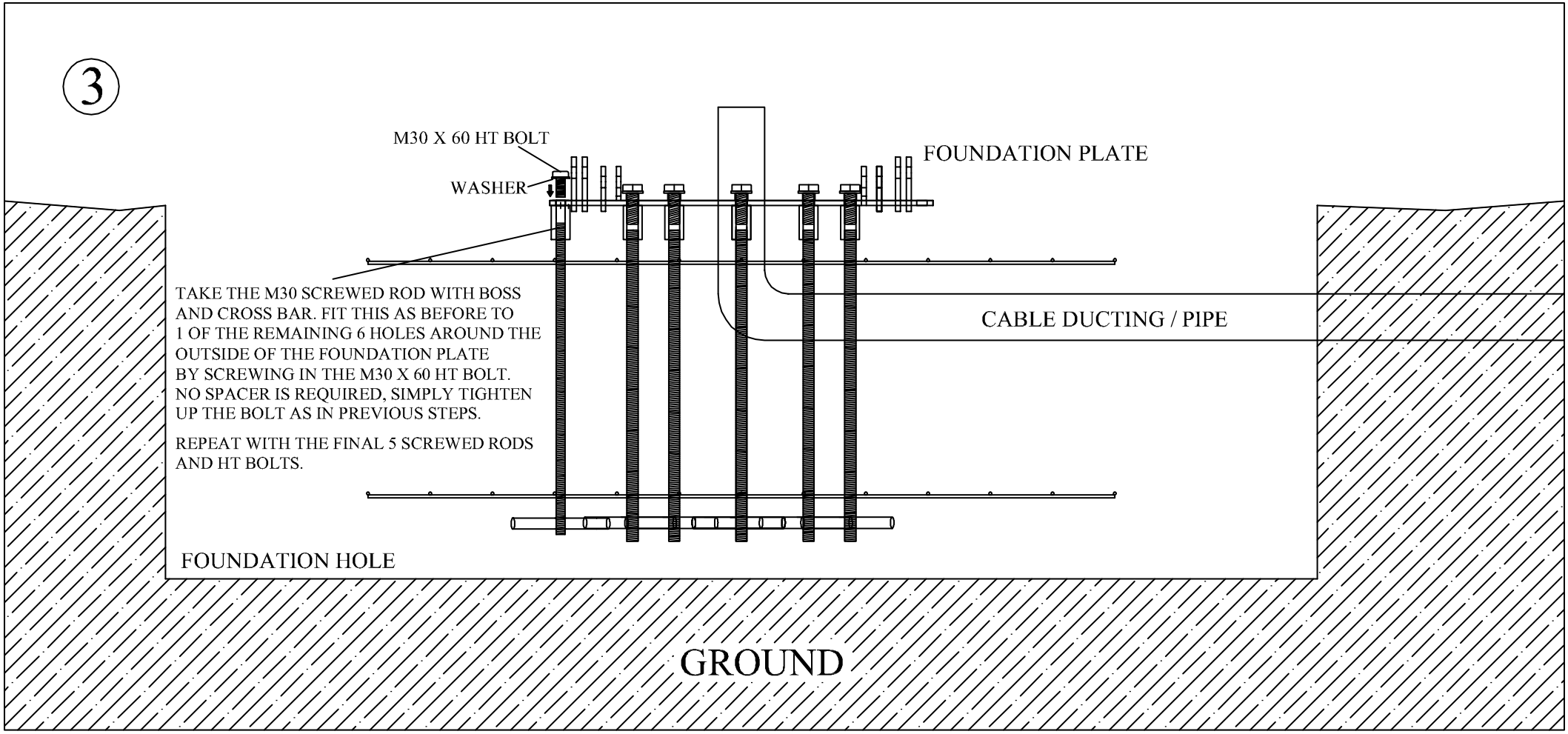
Drawing Title

15kW ASSEMBLY STEPS NO. 2

3



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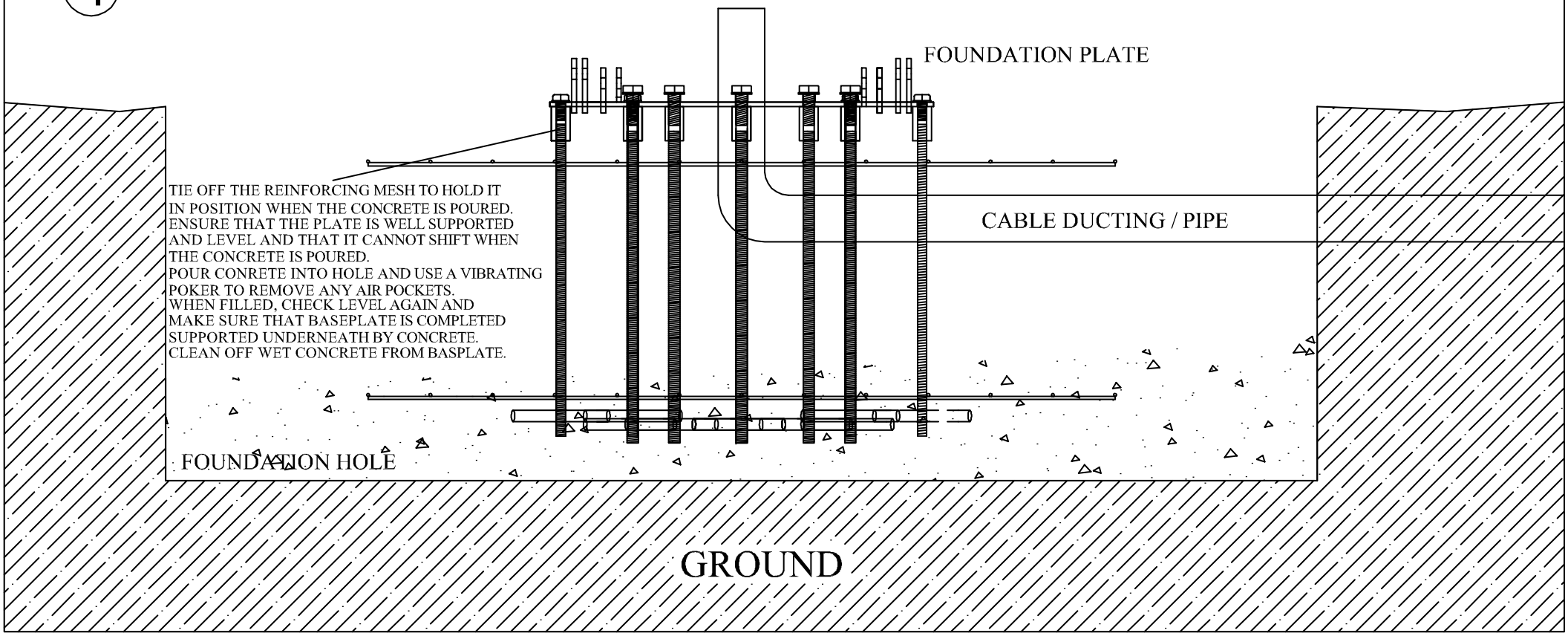
Drawing Title
15kW ASSEMBLY STEPS NO. 3

4



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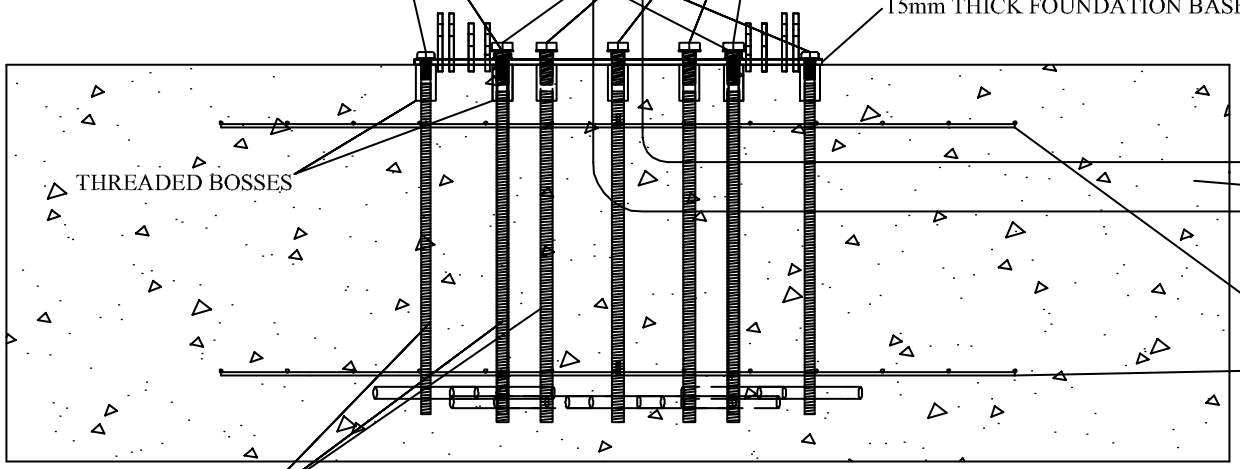
Drawing Title
15kW ASSEMBLY STEPS NO. 4

M30 X 60 HIGH TENSILE BASE BOLTS
6 BOLTS AROUND THE OUTSIDE OF THE FOUNDATION PLATE, SECURING BASEPLATE TO CONCRETE FOUNDATION.

M36 X 100 HIGH TENSILE BASE BOLTS
10 BOLTS WITH A PCD OF 735mm
THESE BOLTS SECURE THE TOWER TO CONCRETE FOUNDATION.



100mm DIAMETER PIPE OR SIMILAR FOR CABLE DUCT CAST INTO CONCRETE

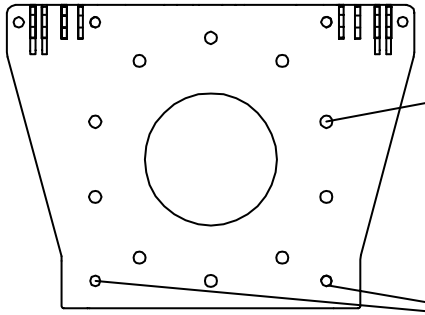
STEEL REINFORCING MESH

CONCRETE :
35 NEWTON
OR BETTER

M30 & M36 HT SCREWED ROD 1M LENGTHS
WITH WELDED BOSSES AND CROSS BARS.

HOLE 3.7M SQUARE BY 1.2M DEEP

WT15000 15M PROVEN MAST
FOUNDATION BASEPLATE



10 HOLES CLEARANCE FOR
M36 X 100 HT BOLTS.
CIRULAR PATTERN PCD 735mm

6 HOLES CLEARANCE FOR
M30 X 60 HT BOLTS.
OUTSIDE HOLES.

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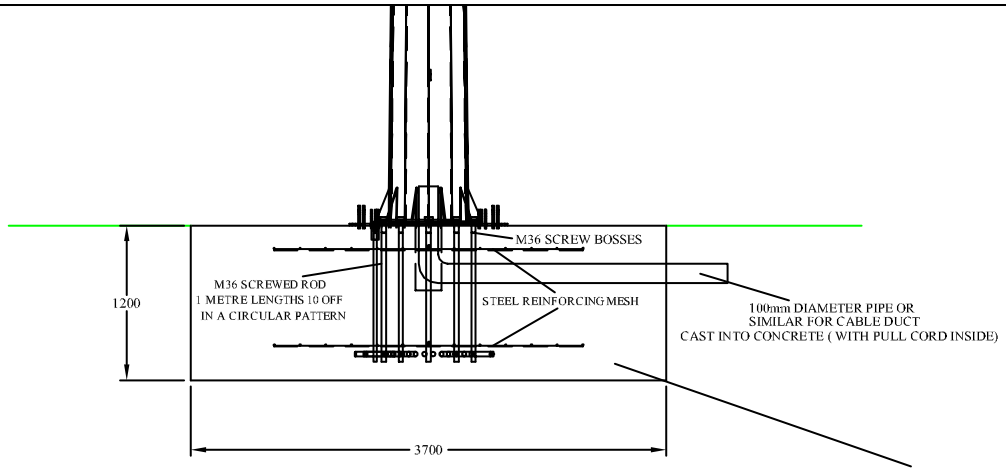
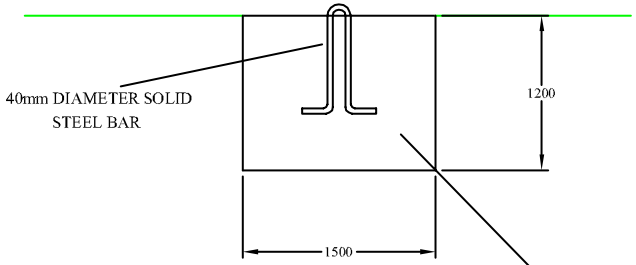
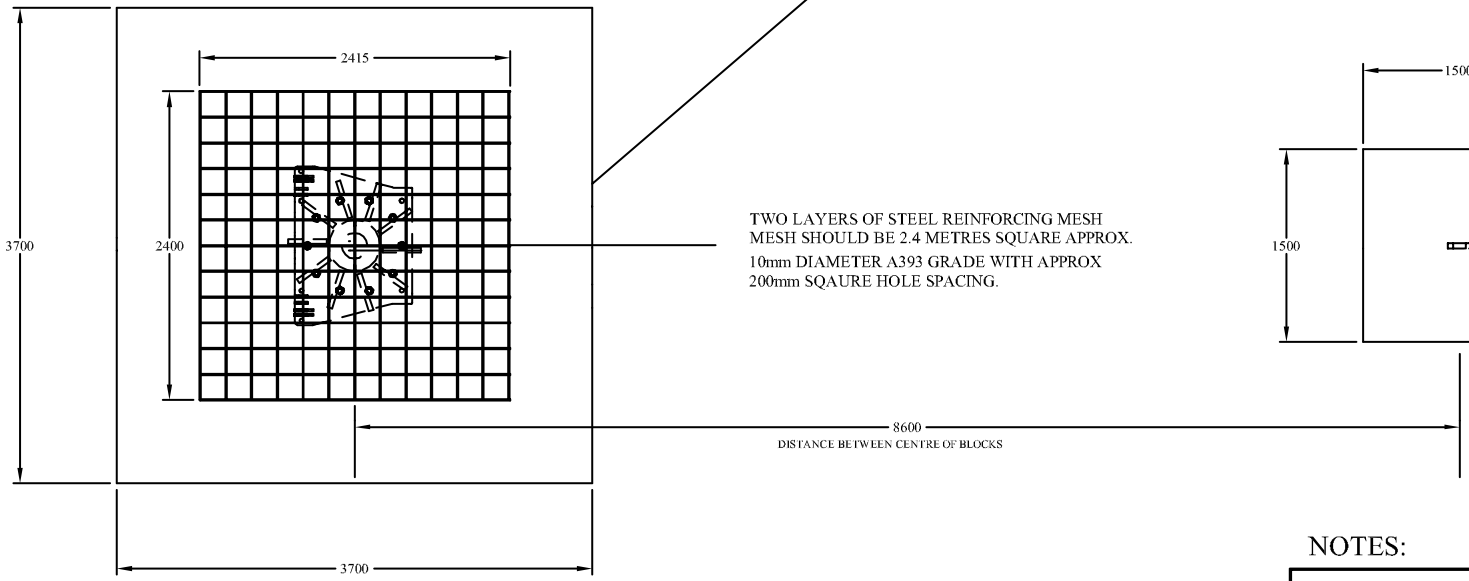
Drawing Title
15kW 15m TOWER FOUNDATION DIAGRAM



TOWER CONCRETE FOUNDATION BLOCK
HOLE 3.7 METERS SQUARE BY 1.2 METERS DEEP MINIMUM



ANCHOR CONCRETE FOUNDATION BLOCK
HOLE 1.5 METERS SQUARE BY 1.2 METERS DEEP MINIMUM



NOTES:

CONCRETE SHOULD BE
35 NEWTON OR BETTER
CAST CONCRETE DIRECTLY INTO HOLE
DO NOT SHUTTER AND BACKFILL

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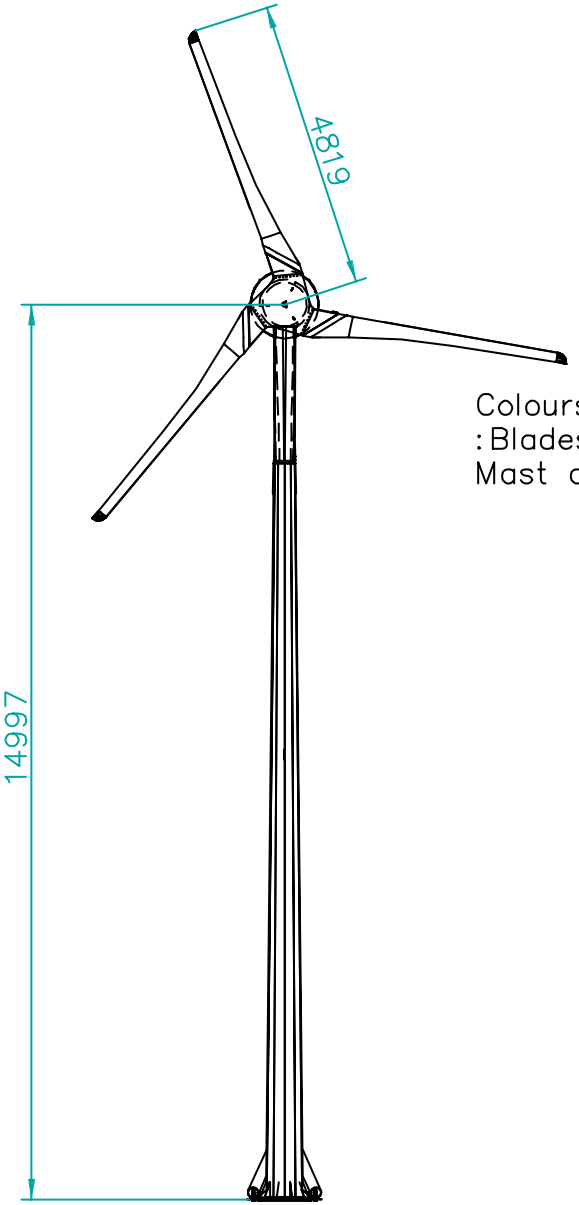
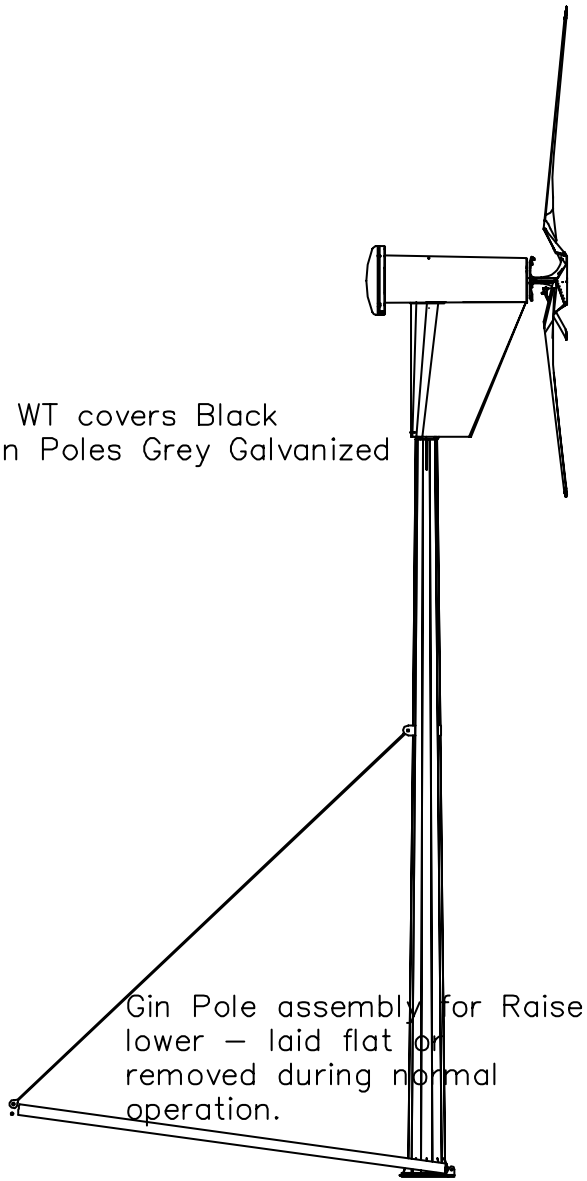
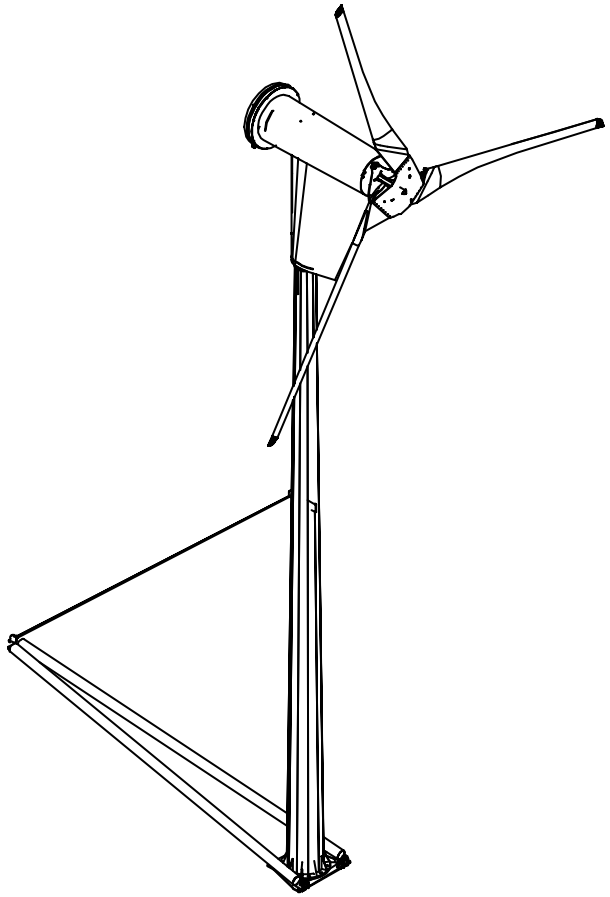
Drawing Title
15kW 15m FOUNDATION LAYOUT DETAILS



Colours: –
: Blades and WT covers Black
Mast and Gin Poles Grey Galvanized



Gin Pole assembly for Raise lower – laid flat or removed during normal operation.



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PREPARED BY GP

CHECKED BY

FSCM NO.

DWG NO. 15000 PL 002

REV 1

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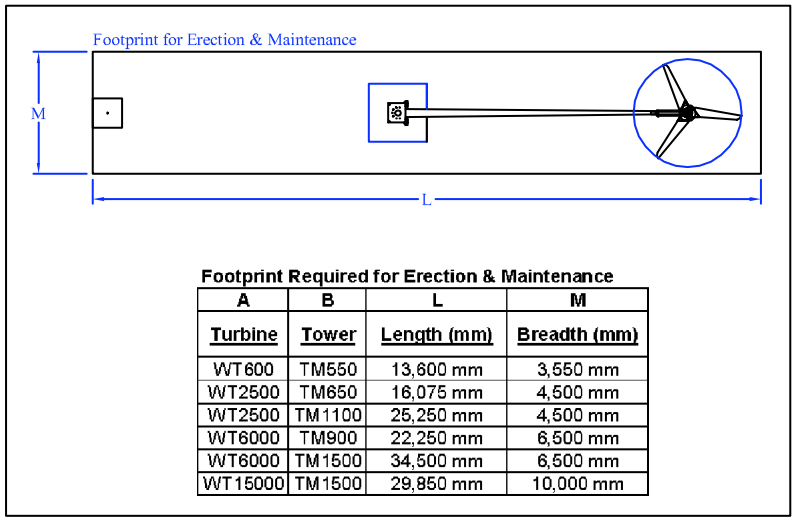
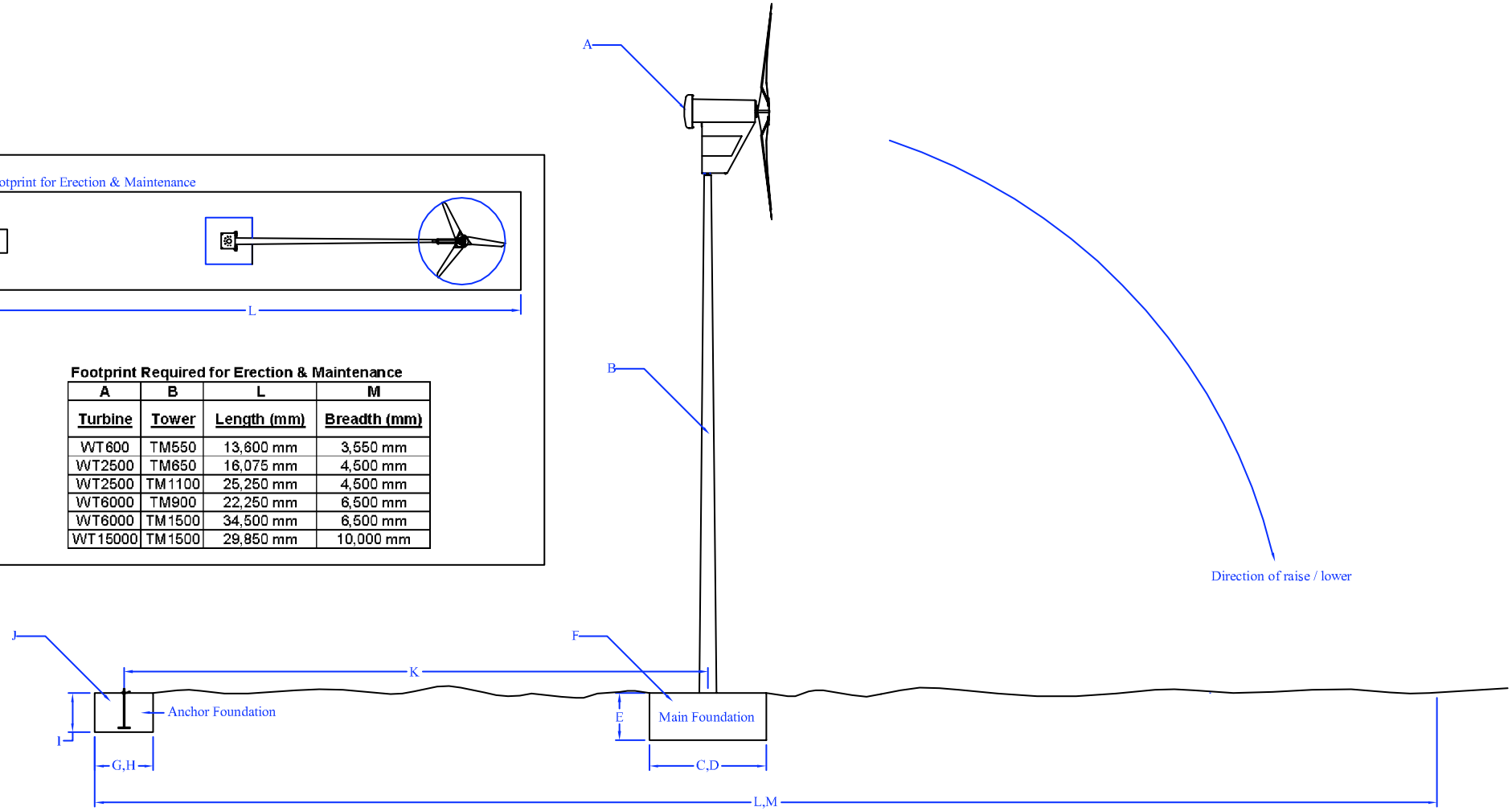
Proven WT15000 Wind Turbine with TM15000 15m Tower – 3D view



Footprint Required for Erection & Maintenance

A	B	L	M
Turbine	Tower	Length (mm)	Breadth (mm)
WT600	TM550	13,600 mm	3,550 mm
WT2500	TM650	16,075 mm	4,500 mm
WT2500	TM1100	25,250 mm	4,500 mm
WT6000	TM900	22,250 mm	6,500 mm
WT6000	TM1500	34,500 mm	6,500 mm
WT15000	TM1500	29,950 mm	10,000 mm



Standard Anchor Foundation Sizes

A	B	G	H	I	J	K
Turbine	Tower	Length (mm)	Breadth (mm)	Depth (mm)	Volume (m3)	Distance From Main Foundation (mm)
WT600	TM550	650 mm	650 mm	650 mm	.27 m³	5,500 mm
WT2500	TM650	650 mm	650 mm	650 mm	.27 m³	6,500 mm
WT2500	TM1100	1,000 mm	1,000 mm	1,000 mm	1.00 m³	11,000 mm
WT6000	TM900	1,000 mm	1,000 mm	1,000 mm	1.00 m³	9,000 mm
WT6000	TM1500	1,500 mm	1,500 mm	1,000 mm	2.25 m³	15,000 mm
WT15000	TM1500	1,500 mm	1,500 mm	1,200 mm	2.70 m³	8,600 mm

**All dimensions shown are Proven Energy Ltd's recommended minimums.*

Standard Main Foundation Sizes

A	B	C	D	E	F
Turbine	Tower	Length (mm)	Breadth (mm)	Depth (mm)	Volume (m3)
WT600	TM550	1,000 mm	1,000 mm	1,000 mm	1.00 m³
WT2500	TM650	1,600 mm	1,600 mm	1,000 mm	2.56 m³
WT2500	TM1100	2,500 mm	2,500 mm	1,000 mm	6.25 m³
WT6000	TM900	2,500 mm	2,500 mm	1,000 mm	6.25 m³
WT6000	TM1500	3,000 mm	3,000 mm	1,200 mm	10.80 m³
WT15000	TM1500	3,700 mm	3,700 mm	1,200 mm	16.43 m³

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PREPARED BY AJP | CHECKED BY

FSCM NO. | DWG NO. Generic Foundation Detail.dwg | REV .

DATE 16-05-2005 | SHEET 1

PROVEN
PROVEN WIND TURBINES

Generic Foundation Drawing

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PROVEN CUSTOMER FOUNDATION CONFIRMATION

Please read the following statement. On completion of your foundation work please sign the statement and return to Proven Engineering Products Ltd, at the above address.

I CERTIFY THAT THE FOUNDATIONS FOR THE WIND TURBINE AND TOWER (TO BE INSTALLED AT THE ADDRESS BELOW) ARE COMPLETED AS PER PROVEN INSTRUCTIONS*. I UNDERSTAND THAT I MAY BE CHARGED FOR ADDITIONAL INSTALLATION WORK IF REQUIRED DUE TO ANY DEVIATION FROM THE PROVEN SPECIFICATION**.

SIGNED: _____

DATE: _____

NAME (CAPITALS): _____

SITE ADDRESS: _____

_____

* Foundation specification for each wind turbine model is available from Proven. Please check that you have the current Proven Foundation Pack for your particular wind turbine & tower combination.

**e.g. lack of anchor block, wrong hinge orientation etc.

N.B. This form need only be completed and returned if your system is being installed by Proven Engineers. If your system is being installed by others e.g. Proven Authorised Distributor, consult them directly regarding foundation requirements.