Foundations & Wind loading

Further information on foundations and wind loading for Altron products can be found on the following pages.
This contains useful information which may help when assessing and planning projects using Altron CCTV products.

Foundation sizes for elevated sites and Area D

The table below shows foundation sizes for area D installations and, for exposed, elevated locations, higher than 100-150m above sea level. For areas A,B and C the left hand column shows the foundation size shown in the product foundation page - read across the table for the relevant foundation size to be used for the relevant location.

e.g. in the foundations table on p21 an ACC2/BPLA for country location in area B has a foundations size of 1.2 x 1.2 x 0.6 but the location is at 300m ASL. Look for the foundation size in the left hand column of the table below and read across the row to the 'Elevated foundation' column for the correct foundation size, for the elevated location.

- For locations above 350m above sea level (ASL) and area D locations above 250m ASL, please contact Altron who will advise on product suitability and foundation sizes.
- Products marked with an asterisk in their foundation page are note suitable for installations in Area D or in area C above 200m. Please select an alternative product.

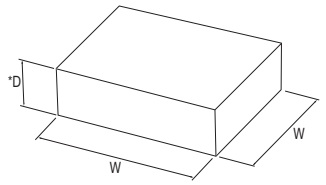
Foundation size Shown in product Foundations table **Area A&B 0-100m Area C 0-150m**	**Area D** foundation size to be used (**0-250m** ASL) instead of area C foundation	**Area A&B** foundation sizes for elevated sites **100-200m** ASL	**Area A&B** foundation sizes for elevated sites **200-350m** ASL	**Area C** foundation sizes for elevated sites **150-350m** ASL
0.8 x 0.8 x 0.4	0.9 x 09 x 0.5	0.9 x 09 x 0.5	1.0 x 1.0 x 0.5	0.9 x 09 x 0.5
0.9 x 0.9 x 0.5	1.0 x 1.0 x 0.5	1.0 x 1.0 x 0.5	1.1 x 1.1 x 0.55	1.0 x 1.0 x 0.5
1.0 x 1.0 x 0.5	1.1 x 1.1 x 0.55	1.1 x 1.1 x 0.55	1.2 x 1.2 x 0.6	1.1 x 1.1 x 0.55
1.1 x 1.1 x 0.55	1.2 x 1.2 x 0.6	1.2 x 1.2 x 0.6	1.3 x 1.3 x 0.65	1.2 x 1.2 x 0.6
1.2 x 1.2 x 0.6	1.3 x 1.3 x 0.65	1.3 x 1.3 x 0.65	1.4 x 1.4 x 0.7	1.3 x 1.3 x 0.65
1.3 x 1.3 x 0.65	1.4 x 1.4 x 0.7	1.4 x 1.4 x 0.7	1.5 x 1.5 x 0.75	1.4 x 1.4 x 0.7
1.4 x 1.4 x 0.7	1.5 x 1.5 x 0.75	1.5 x 1.5 x 0.75	1.6 x 1.6 x 0.8	1.5 x 1.5 x 0.75
1.4 x 1.4 x 0.75	1.5 x 1.5 x 0.75	1.5 x 1.5 x 0.75	1.6 x 1.6 x 0.8	1.5 x 1.5 x 0.75
1.5 x 1.5 x 0.75	1.6 x 1.6 x 0.8	1.6 x 1.6 x 0.8	1.7 x 1.7 x 0.9	1.6 x 1.6 x 0.8
1.6 x 1.6 x 0.8	1.7 x 1.7 x 0.9	1.7 x 1.7 x 0.9	1.8 x 1.8 x 0.9	1.7 x 1.7 x 0.9
1.7 x 1.7 x 0.9	1.8 x 1.8 x 0.9	1.8 x 1.8 x 0.9	1.9 x 1.9 x 1.0	1.8 x 1.8 x 0.9
1.8 x 1.8 x 0.9	1.9 x 1.9 x 1.0	1.9 x 1.9 x 1.0	2.0 x 2.0 x 1.0	1.9 x 1.9 x 1.0
1.9 x 1.9 x 1.0	2.0 x 2.0 x 1.0	2.0 x 2.0 x 1.0	2.1 x 2.1 x 1.1	2.0 x 2.0 x 1.0
2.0 x 2.0 x 1.0	2.1 x 2.1 x 1.1	2.1 x 2.1 x 1.1	2.2 x 2.2 x 1.1	2.1 x 2.1 x 1.1
2.1 x 2.1 x 1.1	2.2 x 2.2 x 1.1	2.2 x 2.2 x 1.1	2.3 x 2.3 x 1.2	2.2 x 2.2 x 1.1
2.2 x 2.2 x 1.1	2.3 x 2.3 x 1.2	2.3 x 2.3 x 1.2	2.4 x 2.4 x 1.2	2.3 x 2.3 x 1.2
2.3 x 2.3 x 1.2	2.4 x 2.4 x 1.2	2.4 x 2.4 x 1.2	2.5 x 2.5 x 1.2	2.4 x 2.4 x 1.2

ASL = Above Sea Level

Notes on foundations

- Grade C35 concrete to be used
- Allow a minimum of 72 hours for concrete to cure before placing pole/column/tower.
- A minimum ground bearing capacity of 75 kN/m² is assumed
- Foundations comply with BS8004 and with the 'Institutes of Lighting Engineers Technical Report Number 7' (ILE TR7).
- Foundation sizes are based on foundations being founded on natural ground. For made up ground, further assessment on ground suitability may be required.
- Foundation sizes shown are suitable for maximum equipment load and wind surface area as shown in product technical tables. For greater loads, foundations sizes will need to be increased, please contact us and we will advise on product suitability for greater loads and foundation requirements.
- Foundation sizes shown are not suitable for installations that include PV/ solar panels or small wind turbines. For this type of installation please contact our Sales office.

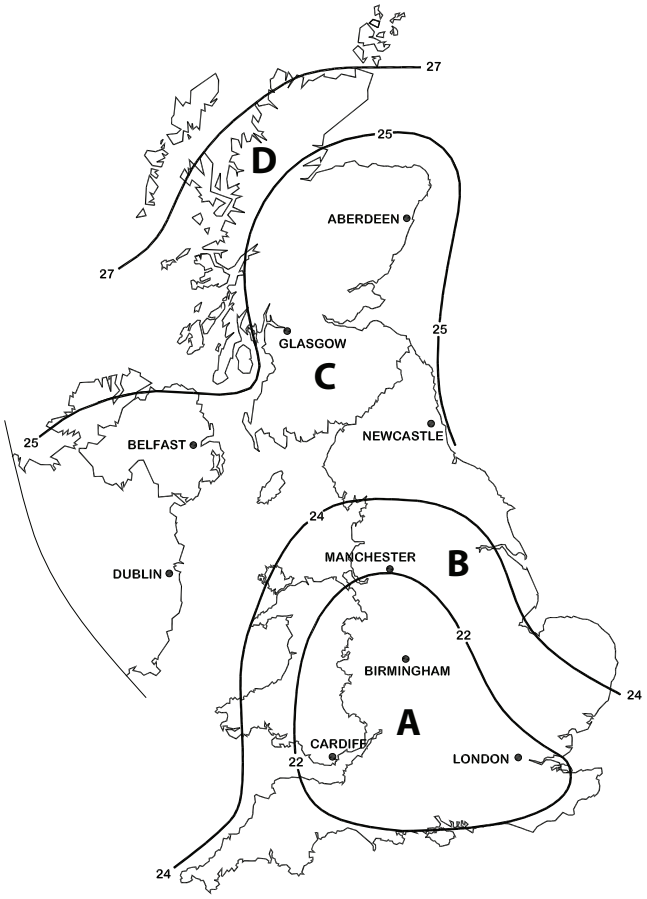
Foundation sizes in table are W x W x D



*D= 1000 on PM and buried flange/embedded base models

Factors that effect foundation sizes & installations wind surface area

The main factor that determines foundation size (other than the location of the installation), is the wind surface area of the equipment being mounted on the pole/ tower/ column. It is the wind surface area that produces the wind force (kgf) that transfers itself to the foundation, for which the foundation needs to be of sufficient size to overcome the 'over turning moment' produced by this lever force. The greater the surface area of equipment at the top of the structure, the larger the foundation size required, so it is very important that the 'Max equip surface area' shown in our technical tables is not exceeded. An extreme example of this is a solar panel which can be very light - only a few kilograms, but can have a large surface area and therefore require a much larger foundation size than the ones we state.



UK wind speed map

The UK map shows Basic Mean Hourly windspeeds with the contour lines defining areas A,B,C and D. Windspeeds are shown at sea level and for every 100m increase in altitude, the Basic Mean Hourly windspeed increases by 10%, then giving the Site Mean Windspeed.

This Map is represented in BS EN 8100, design standard for lattice towers and is also used for wind loading requirements for ILE TR7 (which refers to BS 6399 and this map in Fig. 6). Therefore the wind loading data used in the design of our foundations fully complies with the design standards we use for our CCTV lattice towers (BS EN 8100) and our tubular poles and columns (ILE TR7).

Definition of 'Town location' - Town locations are locations within built up areas, with at least 15% of the surface built on, and/or on which the average height of buildings exceed 15m - for locations on outskirts that do not comply with this, 'Country location' for foundation sizes should be used.

Definition of 'Country location' - All areas, both coastal, up to 100m ASL and inland up to 200m ASL, that are not 'Town locations' (see table for higher altitudes).

STANDARD					AREA A & B FOUNDATIONS UPTO 200m ASL			AREA AB & C FOUNDATIONS UPTO 350m ASL		
Area	Max Basic Mean Hourly Windspeed	Height above sea level for foundation design	Site mean wind speed	Actual wind velocity	Height above sea level for foundation design	Site mean wind speed	Actual wind velocity	Height above sea level for foundation design	Site mean wind speed	Actual wind velocity
A	22 m/s	100m	24.2 m/s	41.8 m/s (93 mph)	200m	26.4 m/s	45.6 m/s (102 mph)	350m	29.7 m/s	51.4 m/s (115 mph)
B	24 m/s	100m	26.4 m/s	45.6 m/s (102 mph)	200m	28.8 m/s	50 m/s (111 mph)	350m	32.4 m/s	56 m/s (125 mph)
C	25 m/s	150m	28.8 m/s	50 m/s (111 mph)	N/A	N/A	N/A	350m	33.75 m/s	58.3 m/s (130 mph)
D	27 m/s	250m	33.75 m/s	58.3 m/s (130 mph)	N/A	N/A	N/A	N/A	N/A	N/A

International windspeed conversions

Our standard designs are based on a mean hourly wind speed of 28.8 m/s (metres per second). This table shows the conversion from this mean hourly wind speed, to other internationally recognised wind speed measurements. Conversions are taken from the International Code Council 'International Building Code'.

Mean Hourly	3 Sec Gust	10 Min Average	Fastest Mile
28.8 m/s	43.6 m/s	30.1 m/s	34.9 m/s
64.4 mph	97.5 mph	67.3 mph	78 mph
104.4 kph	158 kph	109 kph	126 kph

The actual wind velocity for a 28.8 m/s mean hourly wind speed = 50 m/s, 111 mph, 180 kph.

Specific site location foundation sizes

We can specify a more accurate foundation size for specific site locations. Foundations sizes shown in product tables are for the max allowable head load and for the highest windspeed for the Area A,B,C or D (for instance, the centre of London has a mean wind speed of 22.05 m/s rather than the 24.2 m/s we use for area A in general). Given a specific site location and maximum equipment load that will be employed, we can provide an ideal foundation size that will be the minimum required for the site. This can save on civils costs and also help when there are site restrictions for foundation size.

Foundation design service

For all products, we can provide specific foundation designs, for site conditions that do not comply with our standard designs. We are happy to provide guidance and pricing on request.

Equipment weight

The actual weight of the camera equipment does not significantly affect the foundation size, so for fixed, non-tilting products weight is not an issue. The weight of equipment is only relevant for tilt-down products, where the camera equipment weight needs to be lowered using the winch and winch cable. Weight then is then very important on tilt-down products, so as not to overload the winch and cable mechanism, so for tilt-down products the stated 'max equip weight' should not be exceeded.

Off-set loads

Off-set loads on fixed poles/ towers/ columns, typically produced by using one of our PMB or POB mounting brackets, are not a significant, other than the fact that an off-set load increases the deflection of the structure and the movement of the camera monitor image. Offset loads will also increase the stress on the structure, so even though most Altron poles, towers and columns have plenty of capacity for increased stress, some do not, so it is important to consult with us when anything more than a relatively small offset (600mm) is being used. Towers do not like to be twisted, so a pole is much better for an offset load then a tower, but a larger diameter pole will be needed to keep deflection to a minimum.

Offset loads on tilt-down products are not so desirable, unless in line with the direction of tilt, or if they are balanced (an equal load either side so when tilting the product, it is balanced). If the off-set load is not balanced, then this produces a side load at the hinge point, which can cause the hinge to bind, overloading the winch mechanism and is also a force that the hinge is not designed to take. We therefore recommend that a side load on a tilt-down product is only in line with the direction of tilt, or equal either side, so a balanced load.

Positioning Foundations

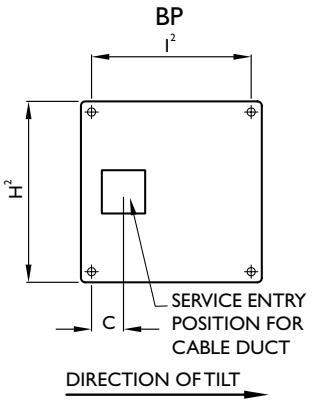
The following factors should be considered when assessing the location of a foundation in accordance with the type of product being used.

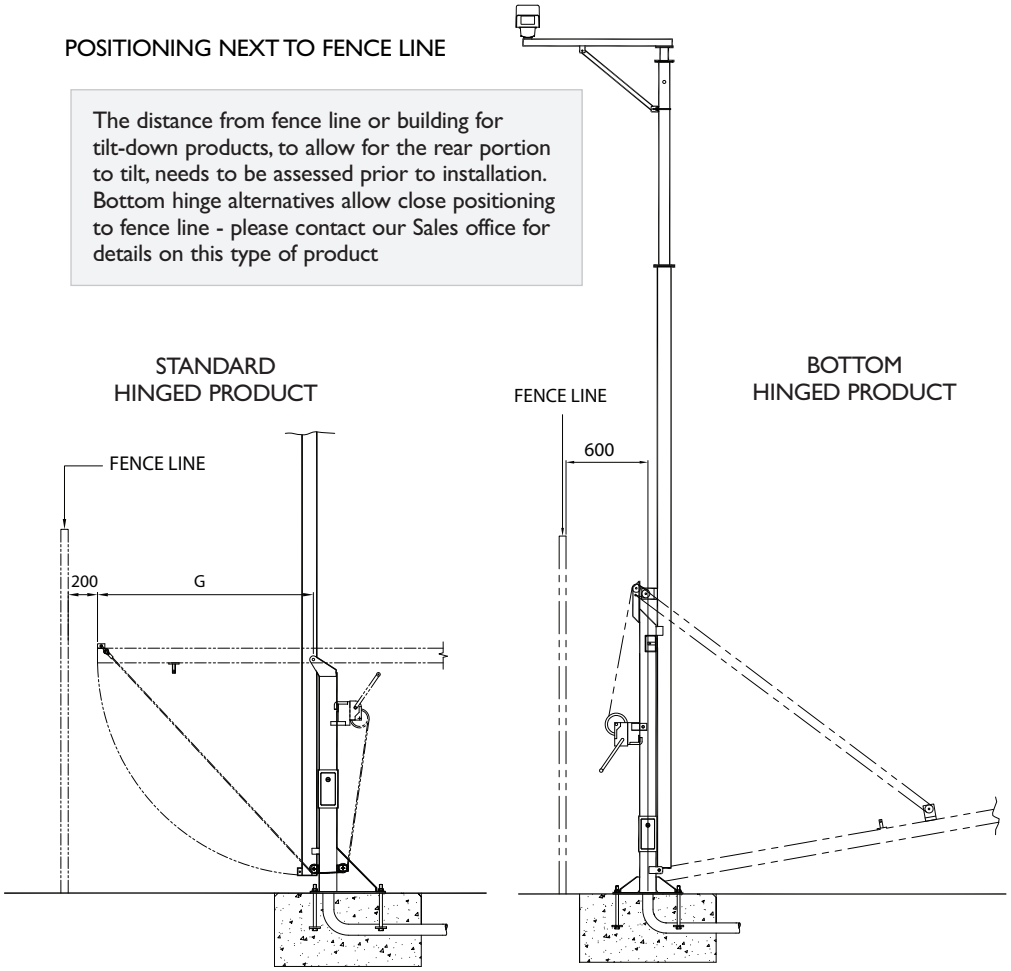
POSITIONING NEXT TO FENCE LINE

The distance from fence line or building for tilt-down products, to allow for the rear portion to tilt, needs to be assessed prior to installation. Bottom hinge alternatives allow close positioning to fence line - please contact our Sales office for details on this type of product

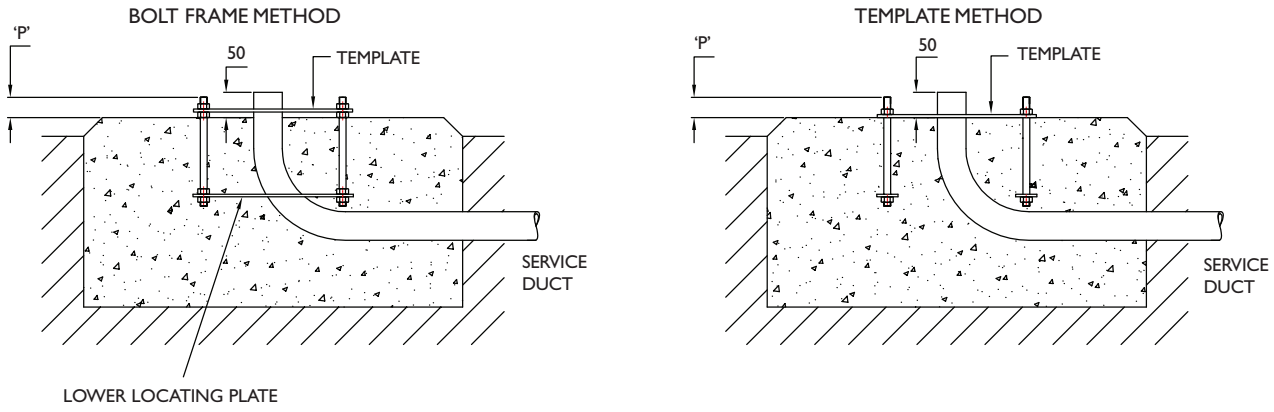
OFFSET OF CABLE DUCT ENTRY IN ACC/ACT BP MODELS

The off set positioning of cable duct entry for ACC/ACT products in conjunction with the direction of tilt needs to be assessed prior to installation, to ensure correct positioning of cable duct.





Flange Plate



Flange Plate Installation Method

1. Excavate as per recommended area and depth.

2. Shutter off top edge level and place ducting - ensure that all shuttering is supported.

3. Assemble bolts through template and screw nuts on so that recommended thread is protruding through template to give the relevant 'P' dimension when bolts are set in foundation, as noted in table.

4. If using bolt frame, ensure that the nut below the top template will be clear of the finished concrete surface level when the 'P' dimension is achieved.

5. For bolt frame method, position the assembled bolt frame in place within foundation pit, using cross slats to bridge pit and position service ducting so that a minimum of 50mm of duct will be proud of the finished concrete surface level.

6. Pour concrete level with top of shuttering, tamp down and level surface.

7. For bolt frame method, use a vibrating poker whilst pouring concrete to ensure no air traps around bolt frame.

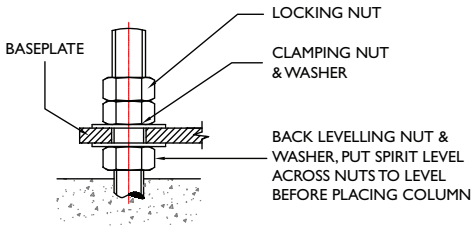
8. For template method, push bolts down into concrete so that template is flat on concrete and nuts are against template with bolts vertical. Ensure that cable duct end is through entry hole in template and protrudes by 50mm min.

9. Allow 72 hours for concrete to cure before placing pole/column

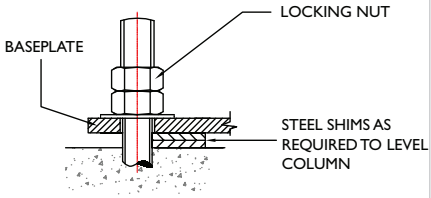
10. Remove template before placing pole.

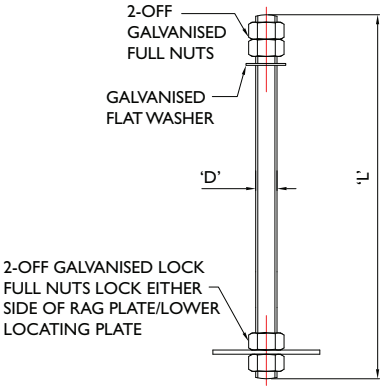
Note: Where back nuts are used to level pole/column it is essential that a load bearing grout is used to fill the void between base plate and concrete. Failure to do this may cause excessive deflection in pole.

ANCHORAGE USING BACK NUT METHOD

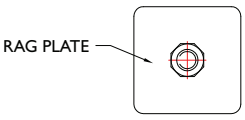


ANCHORAGE USING TEMPLATE SETTING METHOD





Bolt projection		Tightening
Bolt size	P in mm	Torque - NM
M16	50	90
M20	60	190
M24	80	280
M27	100	400

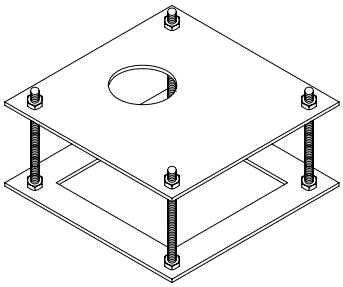


RAG PLATE ASSEMBLY FOR TEMPLATE METHOD SHOWN

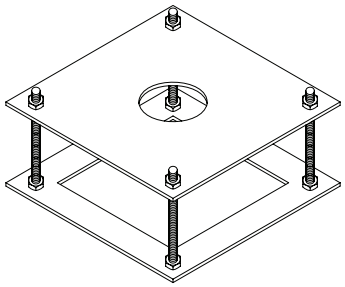
FOR BOLT FRAME METHOD, NUTS LOCK EITHER SIDE OF LOWER LOCATING PLATE

Bolt Frames

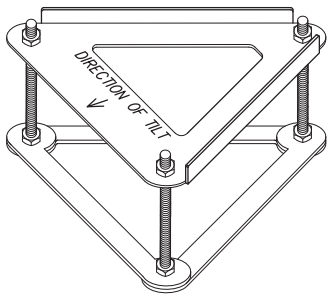
BP BOLT FRAME OPTION
For tilt-down columns & towers



FB BOLT FRAME OPTION
For fixed columns and tubular fixed & tilt-down poles



ANCT BOLT FRAME
standard on ANCT towers



FOR ANCT INSTALLATION DETAILS REFER TO SHEET 4940-26

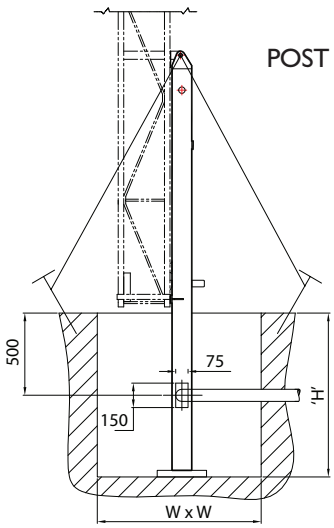
→ Installation Methods

PM Method for columns and towers

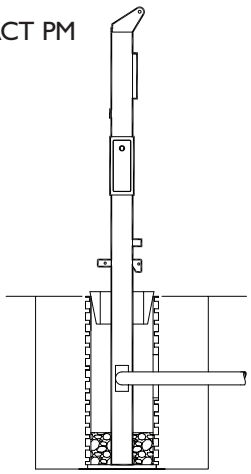
1. Excavate as per recommended area and depth.
2. Shutter off top edge level and place ducting - ensure that all shuttering is supported.
3. Place 100mm of hardcore (paving slab) under post.
4. Guy from top of post with 3-4 stakes and guy ropes.
5. Plumb level post by adjusting guy ropes position ducting as required, ensuring it is supported sufficiently.
6. Pour concrete and check post for plumb.
7. Allow 72 hours for concrete to cure.
8. Remove guys and stakes.
9. Fix tower to post.

Post Mounted

Alternative method as used on embedded pole / column installation



POST FOR ACC/ACT PM



FOR FURTHER DETAILS REFER TO SHEET 4940-36

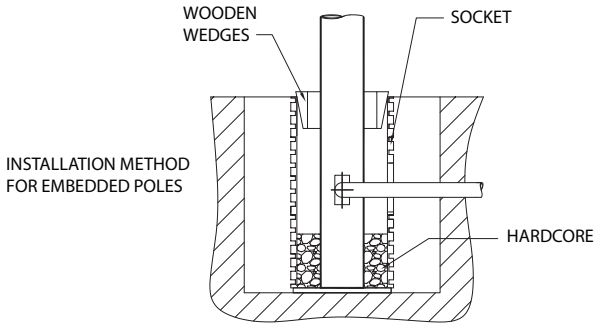
FOR FURTHER DETAILS REFER TO SHEET 4940-23

Embedded base installation method

1. Excavate as per recommended area and depth
2. Set socket into excavated pit on 2no 1 inch thick slabs or suitable hardcore
3. Ensure socket verticality and that it is supported centrally.
4. Position service duct so that 100mm enters the socket, ensuring correct orientation with service entry point on pole.
5. Pour concrete on the outside of the pipe and fill pit to just below the top level of the socket.
6. Allow to cure for minimum of 72 hours
7. Lower pole into socket and support in position for operations 8-11
8. Fill hardcore and sand around the base of the pole to a depth of approx 150mm
9. Pack this down so that it is well compressed
10. Select timber wedges and wedge pole in 3 places ensuring pole is vertical
11. For poles up to 7 metres in height pour concrete into open socket. For poles over 7 metres in height use a cementitious grout instead of concrete. Use a vibrating poker to ensure no voids or air traps.
12. Allow 72 hours to cure
13. Remove wedges and fill gaps with grout

Embedded Base

POLE/COLUMN

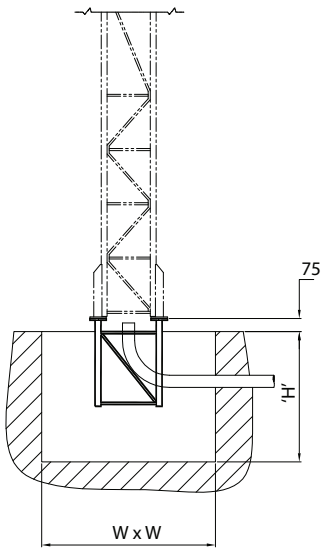


FOR FURTHER DETAILS REFER TO SHEETS
4940-24 FOR COLUMNS
4047-1 FOR POLES

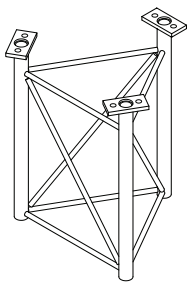
FB Method for towers

1. Excavate as per recommended area and depth.
2. Shutter off top edge level and place ducting - ensure that all shuttering is supported.
3. Support tower ground frame in excavated base by tying wooden slat across top of frame and resting end of slat either side of base.
4. Support slats in raised position so that top of tower ground frame is 75mm proud of base surface.
5. Position ducting so that it enters the base next to the required tower leg.
6. Level frame across the 3 No. flange ends.
7. Pour concrete and then check frame is level.
8. Allow 72 hours for concrete to cure before placing tower.

ACT FB



ACT-FB GROUND FRAME



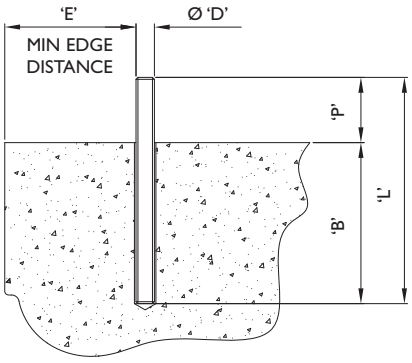
FOR FURTHER DETAILS REFER TO SHEET 4940-25

Alternative holding down methods

Installation of chemical anchors

For use on existing cast foundations or as an alternative to standard holding down bolts.

- We recommend the use of chemical anchors over expanding sheath type anchors.
- We can supply the chemical anchors shown below ex stock.
- For full details on chemical anchors and installation method please contact our Sales team.



ØD	P	B	L	E
M16	65	125	190	170
M20	90	170	260	220
M24	85	210	295	260
M27	100	240	340	300

TEMP °C	TIME TO CURE DRY	WET
0	15 HRS	30 HRS
10	3 HRS	6 HRS
20	30 MINS	1 HR

Installation method

1. Drill correct diameter and depth of hole for the stud.

2. Clean the hole using a brush and air pump.

3. Insert chemical capsule into the hole connect stud to drilling machine using an appropriate driver.

4. Offer stud to capsule and switch on machine. Drive stud into capsule to full depth. To prevent over mixing, stop rotation as soon as bottom of hole is reached. Leave undisturbed until resin has set.

5. Position baseplate and tighten to recommended torque.

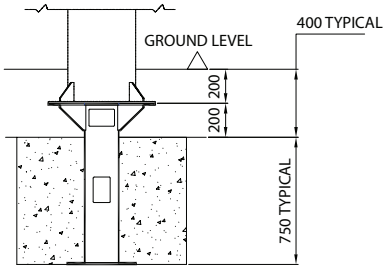
To ensure correct installation of chemical anchor bolts an experienced contractor should be employed.

Buried flange members

- Where underground services restrict the possible location of the foundation/ camera position, buried Flange Members can often overcome congestion & provide a solution. Buried flange members can also be used as an alternative to other standard holding down methods and also to acheive installations typically outlined below, where other methods are not suitable.

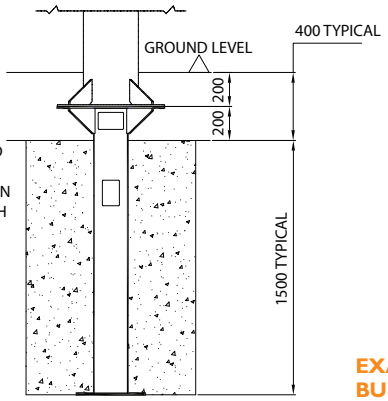
STANDARD

BURIED FLANGE USED
INSTEAD OF ANCHOR BOLTS



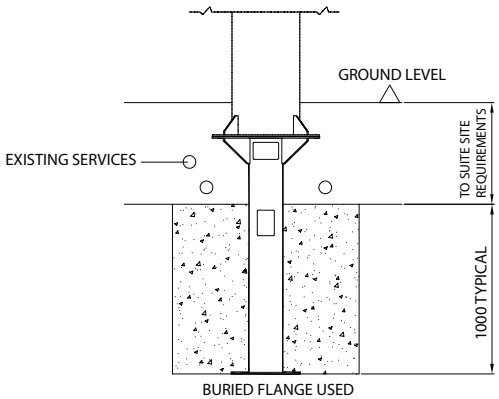
EN 40 BASE

BURIED FLANGE USED FOR DEEP NARROW FOUNDATION - DESIGN IN ACCORDANCE WITH EN40 - ALSO USED AS ALTERNATIVE TO EMBEDDED BASE OPTION ON TALLER POLES



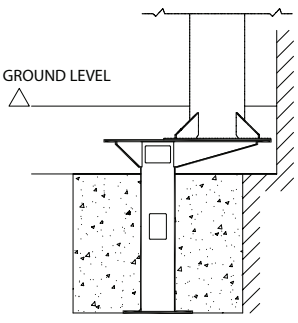
EXAMPLE OF SPECIAL BURIED FLANGE DESIGN

OVERCOMING SERVICES



BURIED FLANGE USED
TO OVERCOME SERVICES
OBSTRUCTIONS UNDERGROUND

OFFSET COLUMN



BURIED FLANGE TO ENABLE
OFFSET POSITIONING OF POLE
IN RELATION TO FOUNDATION