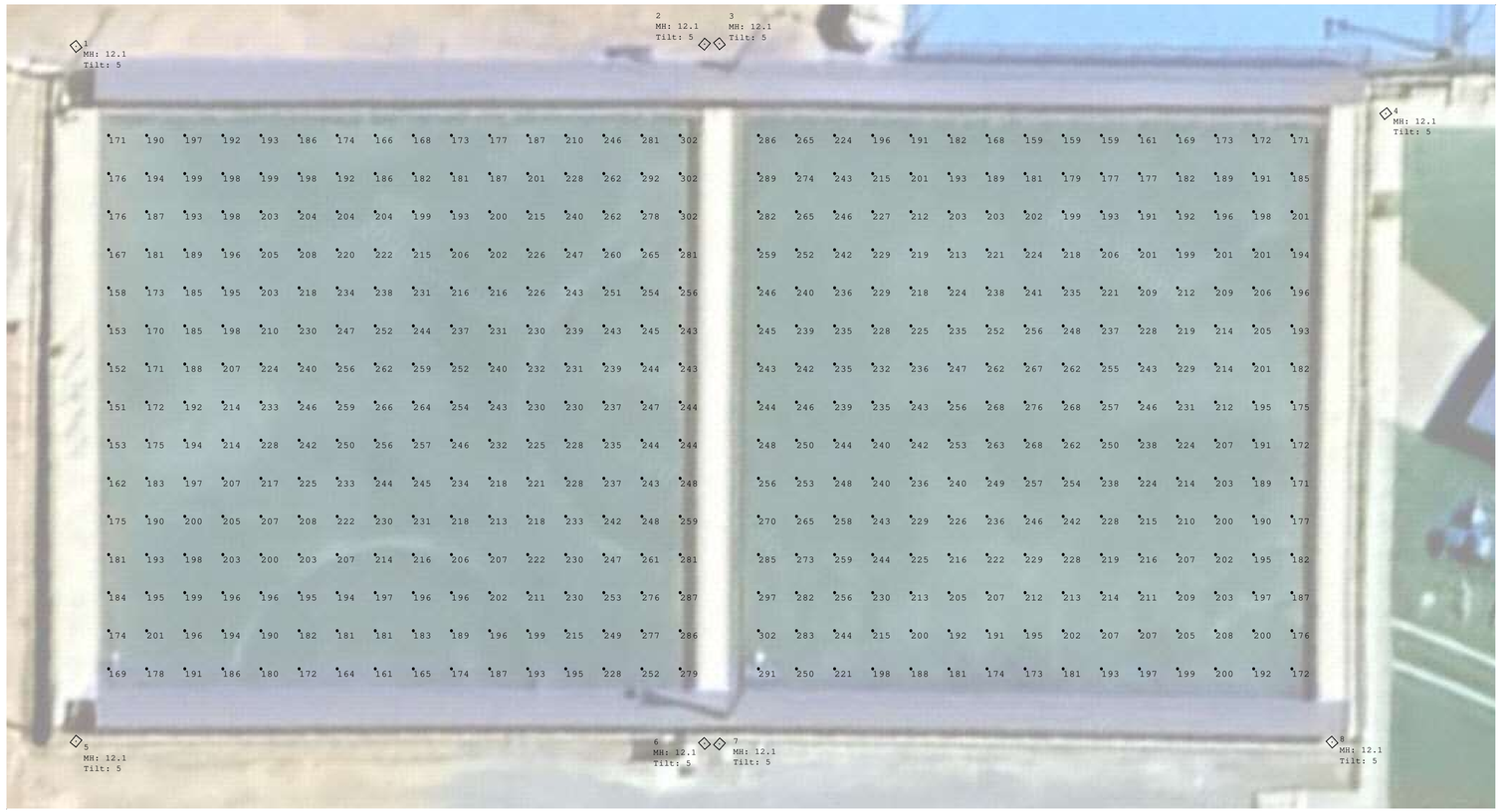

OUTDOOR BOWLING GREEN DESIGN NOTES:

Lighting Layout, Calculation Summary & Notes:
This Sports Lighting Assessment is based on the Light Technical Parameters and Guidelines from Australian Standard AS2560.2:2021, "Sports Lighting Part 2 Specific Applications".

The lighting design has been undertaken to comply with the requirements of Section 2.11.2.1 - LTP's for Outdoor Bowling Greens, level of State/National Competition.

Calculation Grids as per Clause 2.3.2.2 in AS2560.2:2021 have been incorporated

Pole locations are based on the contractor's proposed locations.

The glare rating has been calculated using observer positions located in accordance with the recommendations in AS2560.2:2021.

Surface reflectance's have been used in accordance with the recommendations in AS2560.2:2021.

This assessment does not take into consideration the effect of any obstructions that may impact the design including buildings, trees, fences etc.

Calculation values may differ to onsite results due to environmental variations such as actual luminaire positioning, surface reflectance & finishes, supply voltage, local luminaire ambient temperature, obstructions / furniture etc. These results are also subject to normally accepted photometric tolerances, and calculation/program uncertainties.

A Light Loss Factor (LLF), accounting for LED lumen and dirt depreciation, of 0.88 has been used for all luminaires.

LUMINAIRE ARRANGEMENT:
Light poles are based on a height of 12m.

Luminaire Schedule						
Project: Luminaires						
Symbol	Qty	Arrangement	Description	LLF	Luminaire Lumens	Luminaire Watts
·	8	Single	Light Application/Soga - Leopard Cat No. SG-LP-1000W-A60M	0.880	150754	1000

Calculation Summary								
Project: Greens 1-2 - Eh & U2								
Label	CalcType	Units	Avg	Max	Min	Min/Avg	Min/Max	UG
Green 1 - Eh & U2	Illuminance	Lux	215.92	302	151	0.70	0.50	1.17
Green 2 - Eh & U2	Illuminance	Lux	221.26	302	159	0.72	0.53	1.18

Calculation Summary		
Project: Glare Max		
Label	CalcType	Max
Glare Max	Glare Rating	31.0

UWLR Area Summary	
Project: UWLR	
Label	UWLR
UWLR	0.001

Table 2.3.1 — LTPs for outdoor (including covered[a]) bowling greens

Level of play	Average horizontal maintained illuminance ($\bar{E}_h$)	Minimum horizontal uniformity		Maximum uniformity gradient per 2.5 m		Maximum glare rating (GR)	Minimum colour rendering index (R_a)
		($E_{hmin}/\bar{E}_h$)	(E_{hmin}/E_{hmax}) (U_2)	G	UG		
Recreation, training, and club competition	100[b]	0.60	0.40[c]	30 %	1.43	50	65
State/national competition	200	0.70	0.50[c]	25 %	1.33	50	65

[a] The term "covered" is defined under the term "outdoor sports" in Clause 1.4.13.

[b] For competition level 150 lx is preferred where practicable, particularly for covered greens.

[c] Where two or more greens are adjacent, and with luminaires operating simultaneously U_2 may be reduced to a minimum value of 0.3.

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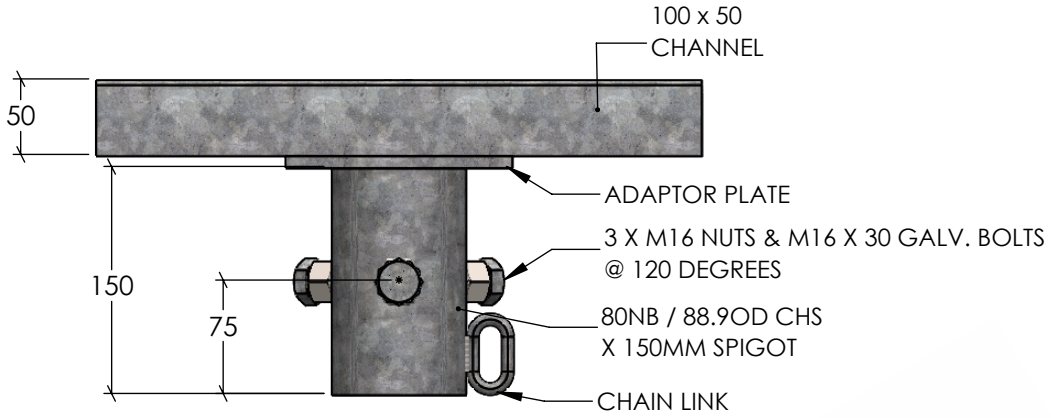
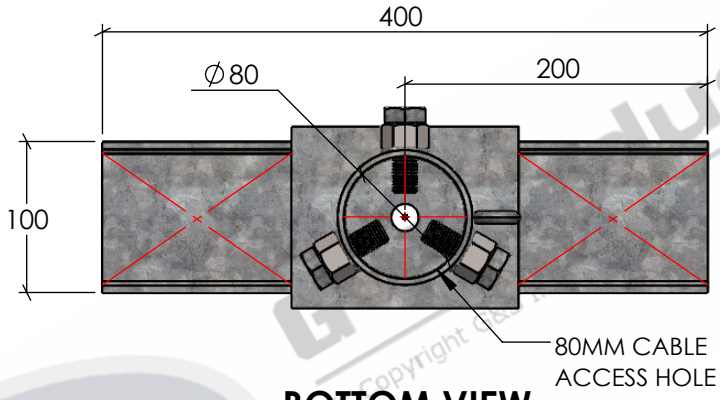
TITLE:	**KELLERBERRIN BOWLING GREENS** State/National Competition Luminaire Schedule, Calculation Summary, Notes and Standards Referenced	DRAWN DATE: 06/08/2024	No Scale Drawn: MG REV: 1
		CLIENT:	Checked: .. Approved: .. SIZE: A1



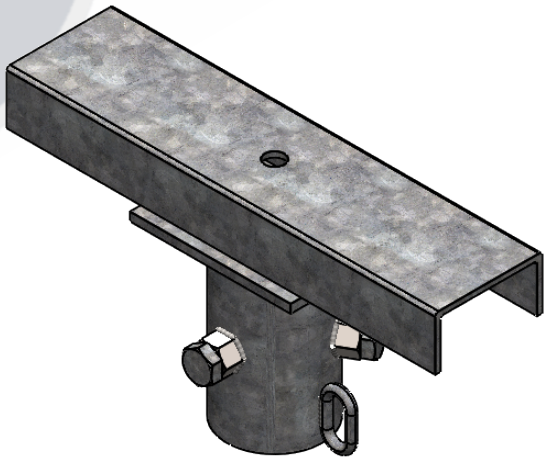
SIDE VIEW

SCALE 1:5



BOTTOM VIEW

SCALE 1:5



ISOMETRIC VIEW

SCALE 1:5

STANDARDS

ALL PRODUCTS TO CONFORM TO THE FOLLOWING AUSTRALIAN STANDARDS.

* AS 1170.2 Structural design actions - Wind actions.
* AS 1554(set) Structural steel welding set.
* AS 2159: Piling - Design & Installation.
* AS 2870: Residential slab footings - Construction.
* AS 3600: Concrete structures.
* AS 3678: Structural steel - Hot rolled plates, floorplates and slabs.
* AS 4680: Hot dip galvanized (Zinc) Coatings on fabricated ferrous articles.
* AS/NZS 4671: Steel reinforcing materials.
* AS/NZS 4600: Cold formed steel structures.

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SCALE: AS SHOWN | PRODUCT WEIGHT: 5.2kg.

PRODUCT FINISH: HOT DIPPED GALVANIZED

CUSTOMER APPROVAL :

CUSTOMER NAME / PROJECT :

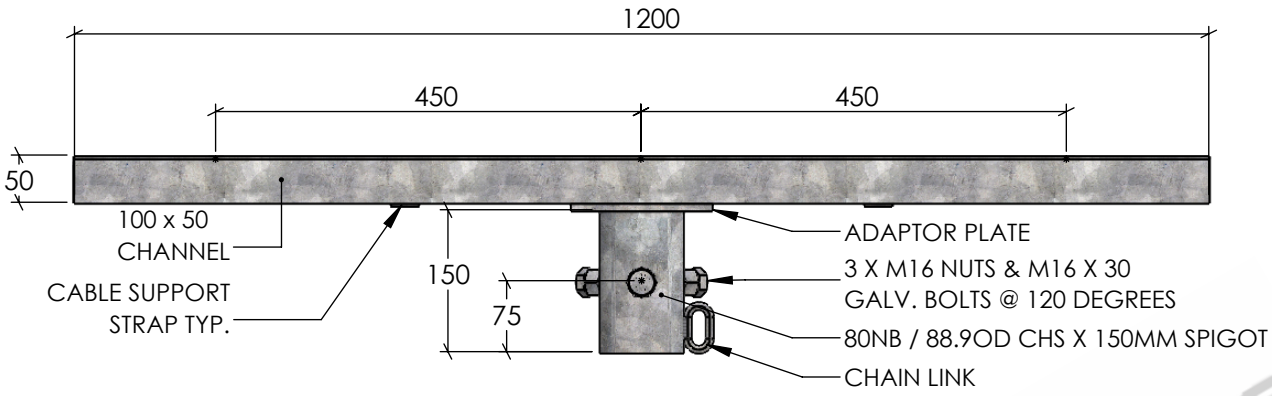
	NAME	DATE
DRAWN	N. A.	14.10.2022
CHECKED	S. G.	14.10.2022
APPROVED	R. G.	14.10.2022

PART NUMBER : **CA400T1**

TITLE : **400MM CROSSARM TO FIT TRUNION MOUNTED LIGHTS**

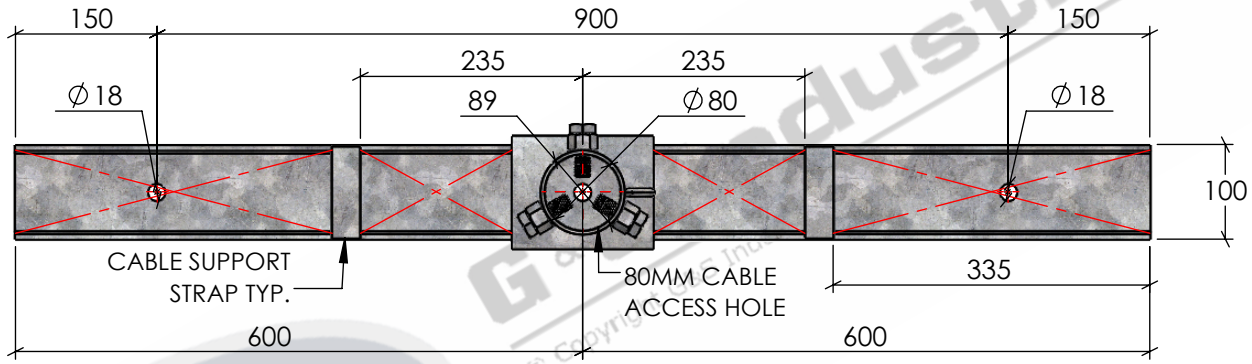
SIZE **A4** | DWG. NO. **ZLRG2168** | REV. **0**

SHEET 1 OF 1



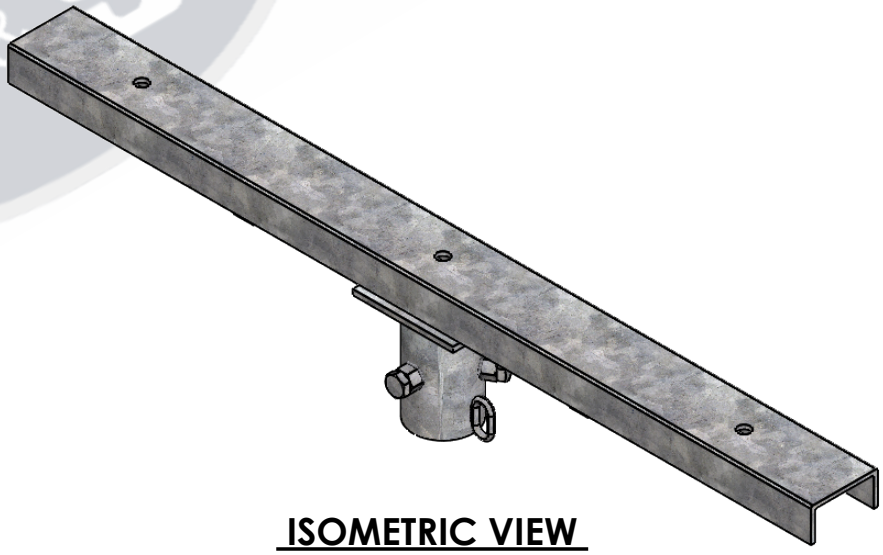
SIDE VIEW

SCALE 1:8



BOTTOM VIEW

SCALE 1:8



ISOMETRIC VIEW

SCALE 1:8

STANDARDS

ALL PRODUCTS TO CONFORM TO THE FOLLOWING AUSTRALIAN STANDARDS.

* AS 1170.2 Structural design actions - Wind actions.
* AS 1554(set) Structural steel welding set.
* AS 2159: Piling - Design & Installation.
* AS 2870: Residential slab footings - Construction.
* AS 3600: Concrete structures.
* AS 3678: Structural steel - Hot rolled plates, floorplates and slabs.
* AS 4680: Hot dip galvanized (Zinc) Coatings on fabricated ferrous articles.
* AS/NZS 4671: Steel reinforcing materials.
* AS/NZS 4600: Cold formed steel structures.

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SCALE: AS SHOWN | PRODUCT WEIGHT: 11.6kg.

PRODUCT FINISH: HOT DIPPED GALVANIZED

CUSTOMER APPROVAL :

CUSTOMER NAME / PROJECT :

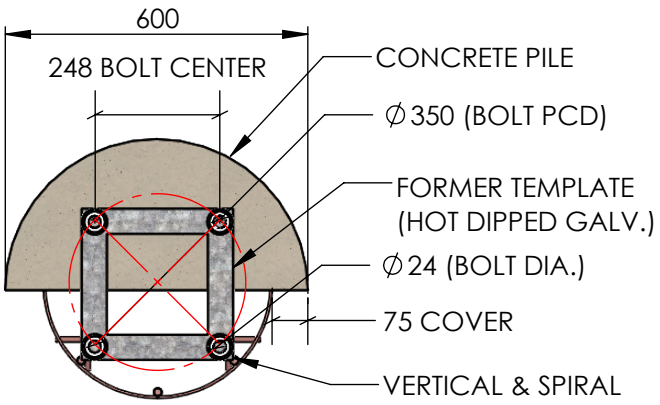
	NAME	DATE
DRAWN	N. A.	14.10.2022
CHECKED	S. G.	14.10.2022
APPROVED	R. G.	14.10.2022

PART NUMBER : **CA1200T3**

TITLE : **1200MM CROSSARM SUIT 3 X TRUNION MOUNTED LIGHTS**

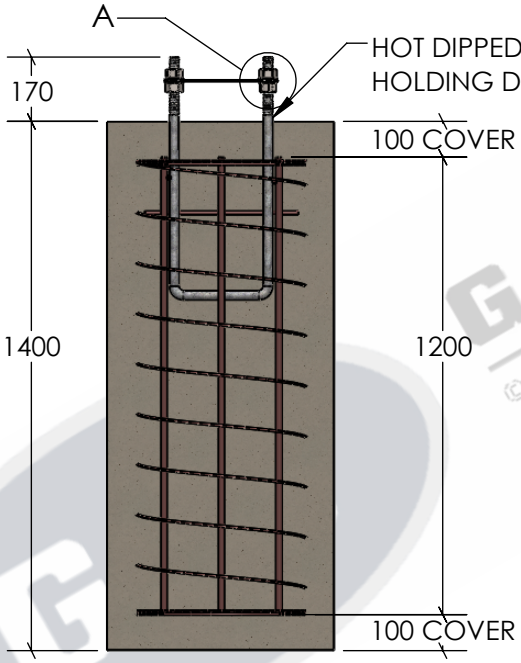
SIZE **A4** | DWG. NO. **ZLRG2171** | REV. **0**

SHEET 1 OF 1



TOP VIEW

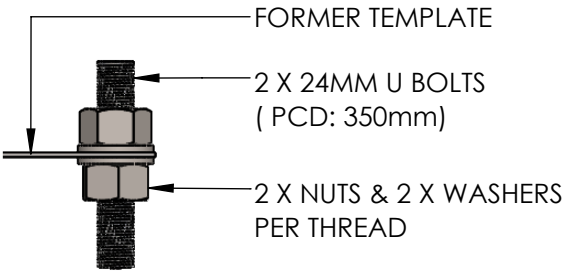
SCALE 1:10



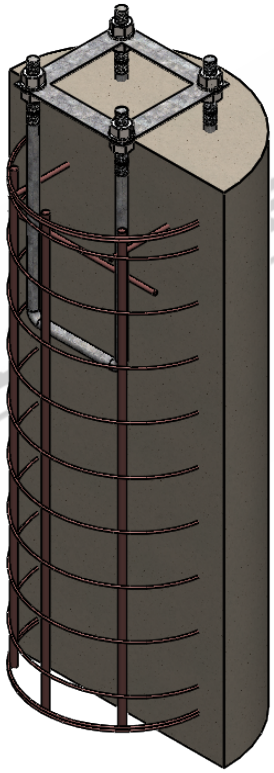
**PILE & CAGE LENGTH MAY VARY WITH SOIL TYPE.*
CONCRETE POURED ON SITE. RECOMMENDED STRENGTH 32MPa.

SIDE VIEW

SCALE 1:20



DETAIL A
SCALE 1 : 5



ISOMETRIC VIEW

SCALE 1:15

STANDARDS

ALL PRODUCTS TO CONFORM TO THE FOLLOWING AUSTRALIAN STANDARDS.

* AS 1170.2 Structural design actions - Wind actions.
* AS 1554(set) Structural steel welding set.
* AS 2159: Piling - Design & Installation.
* AS 2870: Residential slab footings - Construction.
* AS 3600: Concrete structures.
* AS 3678: Structural steel - Hot rolled plates, floorplates and slabs.
* AS 4680: Hot dip galvanized (Zinc) Coatings on fabricated ferrous articles.
* AS/NZS 4671: Steel reinforcing materials.
* AS/NZS 4600: Cold formed steel structures.

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SCALE: AS SHOWN
PRODUCT WEIGHT: 34.4kg. **NOT INCLUDING THE CONCRETE PILE*
PRODUCT FINISH: HOT DIPPED GALVANIZED
CUSTOMER APPROVAL :
CUSTOMER NAME / PROJECT :

	NAME	DATE
DRAWN	N. A.	14.10.2022
CHECKED	S. G.	14.10.2022
APPROVED	R. G.	14.10.2022

PART NUMBER : **CR24/4/350**

TITLE : **24MM (4 BOLT) 350 PCD CAGED RAGBOLT ASSEMBLY SUIT PILE STYLE FOOTING FULLY WELDED AND ASSEMBLED**

SIZE **A4** | DWG. NO. **ZLRG2240** | REV. **0**

SHEET 1 OF 1

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Column Design Engineering

Pile Footings and Foundations

Embedment Depth for Laterally Loaded Piles

Product Description: F12BM - 12M Medium Duty Fixed Tapered Octagonal Column

Product Location: Wind Region A, Terrain Category 2

Refer Table I1 of AS 4676:2000
Recommended values for bearing strength (f_b kPa)
at serviceability limit state for various soil types:

Class	Very Soft	Soft	Firm	Very Firm	Hard
Soil Description	Silty clay and sand; loose dry sand	Wet clay; silty loam; wet or loose sand	Damp clay; sandy clay; damp sand	Dry clay; clayey sand; coarse sand; compact sand	Gravel; dry clay
Strength(f_b)	f_b=< 60	60<f_b=<100	100<f_b=<150	150<f_b=<240	240<f_b

Note: Values in the above table are based on deformations of approximately 12mm under serviceability loads.

Minimum embedment depth given by:

$$D = \frac{3.6.H_R + \sqrt{(12.96.H_R^2 + 16.2.C.M)}}{2C}$$

Eqn I3.2(1) from AS/NZS 4676:2000

where:

H_R = Resultant horizontal force acting on pile (Working Load)

h_r = Resultant Height above ground level at which H_R acts

M = Overturning moment acting on the pile at ground level (Working Moment)

C = f_b x b

b = Effective width of the footing, projected perpendicular to the direction of the resultant horizontal force acting on the pile (If backfill is properly prepared concrete, b may be taken as the diameter of the bored hole).

Inputs:

Soil Type =	Soft		Firm		Very Firm		
H_R =	2.6	kN	2.6	kN	2.6	kN	*working shear*
h_r =		m		m		m	*optional input*
Therefore,							
M =	17.2	kNm	17.2	kNm	17.2	kNm	*working moment*
f_b =	60	kPa	100	kPa	150	kPa	*see table above*
f_{bu} =	90	kPa	150	kPa	225	kPa	
b =	0.6	m	0.6	m	0.6	m	*Dia of pile Foundation*

Outputs:

C =	36		60		90		C = fb x b *for serviceability loads*
Therefore,							
D =	1.524	m	1.156	m	0.932	m	

Add 0.2m (for disturbed ground depth) to minimum embedment depth. Therefore,

depth. Therefore:

Depth $_{reqd\ (m)}$ =	1.724	m	1.356	m	1.132	m
Depth $_{reqd\ (mm)}$ =	1724	mm	1356	mm	1132	mm
Roundup To Nearest 100	1800	mm	1400	mm	1200	mm

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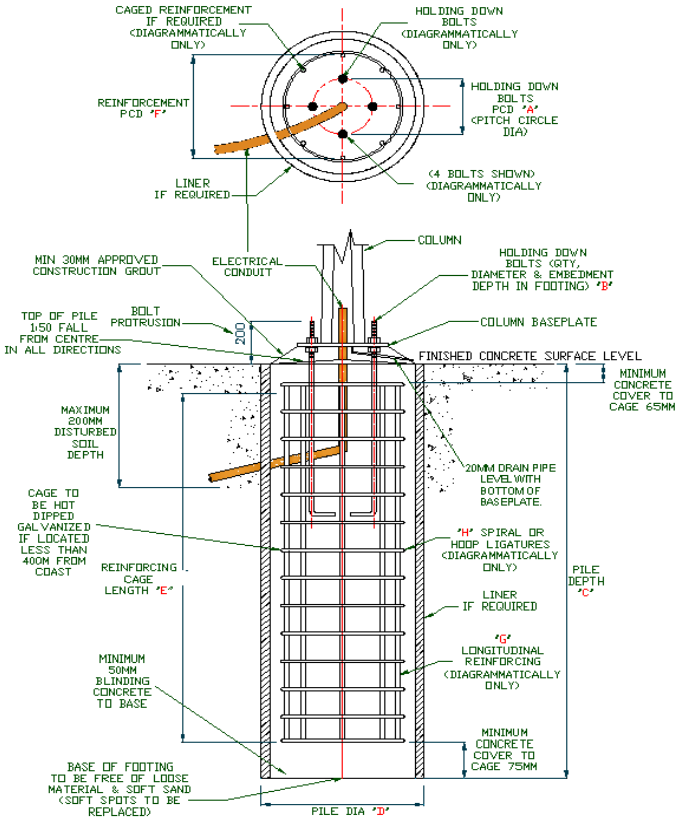
Column Design Engineering

Pile Footings and Foundations

Embedment Depth for Laterally Loaded Piles

Product Description:	F12BM - 12M Medium Duty Fixed Tapered Octagonal Column	Product Location:	Wind Region A, Terrain Category 2



DRAWING DIMENSIONS & SPECIFICATIONS

Dim	Description	Dim
A	Holding Down Bolt "PCD" "Pitch Circle Diameter" (mm)	350

		Quantity & Diameter	Embedment Lnth (mm)	Grade
B	Holding Down Bolts	4 x M24	460	4.6
	Complete Caged Ragbolt Setup (Part Number)	CR24/4/350		

	Soil Type		Soft	Firm	Very Firm
C	Pile Depth (mm)		1800	1400	1200
D	Pile Diameter (mm)		600	600	600
E	Reinforcing Cage Length (mm)		1600	1200	1000
F	Reinforcing Cage "PCD" "Pitch Circle Diameter" (mm)		450	450	450
G	Longitudinal Reinforcing Qty @ Diameter (mm)	Grade 500	6 x N12	6 x N12	6 x N12
H	Horizontal Spiral or Hoop Diameter & Centers (mm)	Grade 500	N6 @ 133	N6 @ 133	N6 @ 133
	Ultimate Base Moment (kNm)	25.8			
	Ultimate Base Shear (kN)	3.8			
	Working Base Moment (kNm)	17.2			
	Working Base Shear (kN)	2.6			

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Column Design Engineering

Pile Footings and Foundations

Embedment Depth for Laterally Loaded Piles

Product Description:	**F12BM - 12M Medium Duty Fixed Tapered Octagonal Column**	**Product Location:**	**Wind Region A, Terrain Category 2**

Pile Foundation Notes

Drawing Dimensions

1. **Dimension "A"** refers to the "PCD" "Pitch Circle Diameter" of the H.D. bolts. This should match the bolt pattern on the corresponding column.
2. **Dimension "B"** above details the H.D. bolt diameter and the minimum bolt embedment into the concrete.
3. **Dimension "C"** denotes the nominated pile length and is based on foundation deformations of approximately 12mm under serviceability loads. Foundations with more stringent deflection limit requirement must be subjected to more rigorous design.
4. The length of pile **Dimension "C"** specified is the minimum length of the pile below natural ground level.
5. These foundation designs have been prepared based on a disturbed soil depth of up to 200mm. Reference must be made to an engineer for assessing soil strength with a disturbed soil layer greater than 200mm.
6. **Dimension "D"** is the pile or augured / drilled hole diameter. It is important to maintain the integrity of cylindrical hole when constructing this type foundation. If the sides of the excavation collapse, the collapsed material must be removed prior to concreting.
7. Casing of piles may be required during construction on sites containing either loose sands or soft clay including sites that have either a high water table or water seepage, so as to maintain the integrity of the open cylindrical hole.
8. **Dimension "E"** denotes the steel reinforcing cage length. As per the drawing, minimum concrete cover to this cage is 75mm at the bottom, 65mm at the top and 75mm around the sides. If the installation site is less than 400 metres from a coastal area, or it is in soil with a high salt content, G&S recommend the reinforcing cage be hot dipped galvanized.
9. **Dimension "F"** is the steel reinforcing cage diameter or "Pitch Circle Diameter" "PCD".
10. **Dimension "G"** denotes the quantity and diameter of the steel reinforcing cage longitudinal or (vertical) reinforcing bars. These bars will be evenly spaced in the "Pitch Circle Diameter" "PCD" to Dimension "F" above. The grade of steel is also specified at this point.
11. **Dimension "H"** denotes the diameter and spacing of the horizontal spiral or hoop reinforcing making up the steel cage. This reinforcing will either be hoops at even spacing or a spiral wind complete with two turns at the top and bottom of the cage. This reinforcing maintains the cage "Pitch Circle Diameter" "PCD". The grade of steel is also specified at this point.

General

1. All dimensions relevant to setting out and off-site work must be verified by the builder or installation contractor before construction is commenced.
2. The above drawings shall not be scaled.
3. During construction, the builder or installation contractor shall be responsible for maintaining the structure in a stable condition and ensuring no part is overstressed during construction activities.
4. All workmanship and materials are to be in accordance with the relevant Australian Standards and the local statutory authorities' regulations including all amendments, except where varied by contractual documents.
5. The pile foundation lengths nominated are based on limit state design loads.
6. These foundation designs have been developed based on Broms' Theory and AS/NZS 4676 Structural design requirements for utility services poles; Appendix I Footings and Foundations.
7. These foundation designs conform to the following codes: AS 3600 Concrete structures and AS 2159 Piling – Design and Installation.
8. The onus for the selection of site soil conditions, the particular foundation and any further engineering design, calculations and verification for the foundation is upon the builder or installation contractor.
9. The soil type should be chosen based on worst expected conditions for each site.
10. The top of the pile must coincide with the final finished surface level of the site.
11. Workmanship and materials are to be in accordance with the current relevant SAA codes and the local Statutory authorities regulations.
12. If the base of the excavation becomes wet prior to pouring concrete then the water and any softened material shall be removed prior to pouring the foundation. If the excavation exposes the water table, the builder or installation contractor must seek advice from an experienced and qualified civil / structural engineer regarding soil suitability. The pile design above does **not** account for the presence of the water table above the bottom of the pile.
13. No excavation, deeper than 600mm shall be made within 3m of the edge of the pile without first seeking approval from a suitably qualified engineer.
14. If in doubt, the builder or installation contractor must engage an experienced and qualified civil / structural engineer to confirm the soil conditions and determine a suitable pile footing size.
15. The responsibility of defining the existing soil conditions rests with the builder or installation contractor, unless that responsibility has been assigned to a qualified and experienced civil / structural engineer.
16. If a liner is used, the ground is to be well compacted to ensure there are no air pockets around the liner. Fines can be washed in around the liner to aid in eliminating any air pockets. The ground is to be compacted until it is restored to its original state of compaction.
17. The above footing design is to be utilized with an cylindrical augured hole. Under no circumstances is a hole to be excavated, liners used and backfilled. If the soil is such that an augured hole cannot be used, we recommend the use of a slab / pad style footing.

Steel Reinforcing

Please see the "Steel Reinforcing" section attached.

Concrete & Post Pouring

Please see the "Concrete Specifications" section attached.

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Column Design Program

Slab Footing Recommended Dimensions

Product Description:	**F12BM - 12M Medium Duty Fixed Tapered Octagonal Column**	**Product Location:**	**Wind Region A, Terrain Category 2**

Nominated Base Width (m)	**1.500**
Calculated Minimum Depth (m)	**0.730**

Depth Required =(2Mo-0.9Qb)/(0.9wb^3-2V)

Constant A	0.675	
v =	22.57	
Ultimate Calculated soil pressure on diagonal	**256.1**	kPa
Proposed depth	**0.750**	m
Constant A	0.66	
v =	23.15	
Ultimate Calculated soil pressure on diagonal	**243.1**	kPa

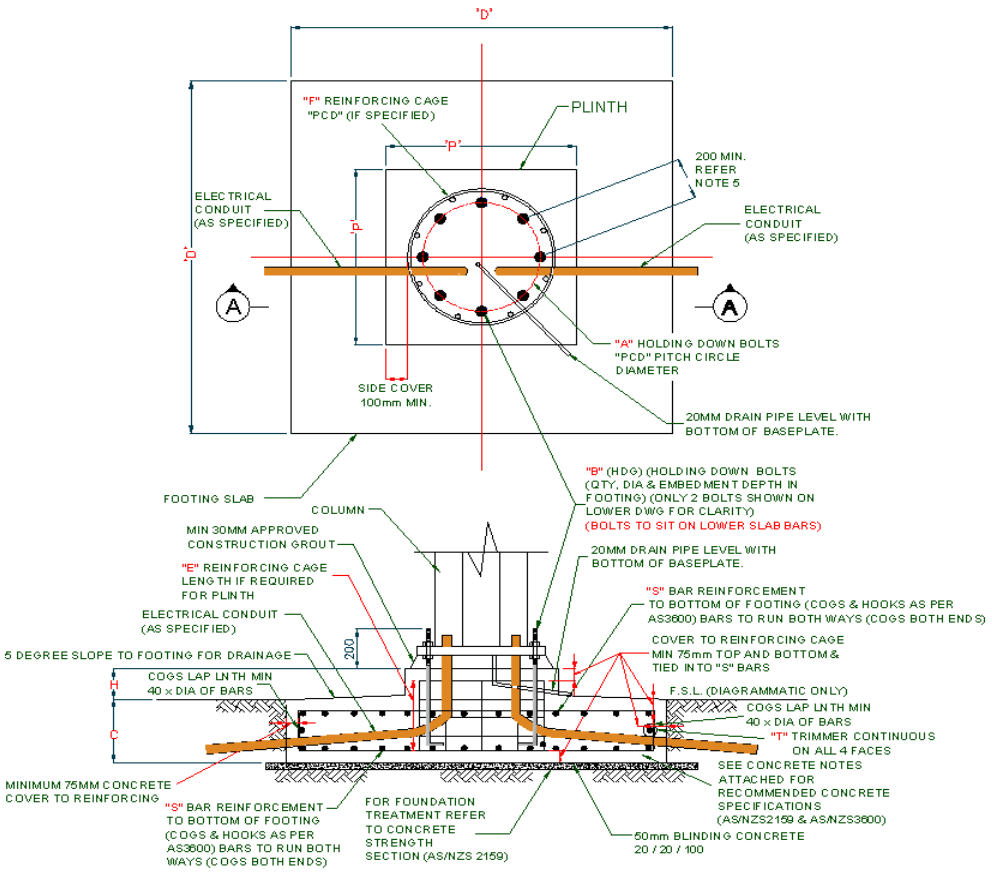
THEREFORE NOMINATED BASE DEPTH OK

FOOTING IS STABLE AGAINST OVERTURNING

Max Ultimate Soil Pressure allowed = **250** kPa

THEREFORE SOIL PRESSURE OK

Drawing Dimensions			
"A"	Holding Down Bolt "PCD" (mm)	350	
"B"	Holding Down Bolt Qty, Dia & Embedment Length (mm)	4 x M24	460
"C"	Footing Slab Depth (mm)	750	
"D"	Footing Slab Width (mm)	1500	
"E"	Reinforcing Cage Length (mm) (If Applicable)	0	
"F"	Reinforcing Cage "PCD" (mm) (If Applicable)	0	
"S"	Bar Reinforcing Dia (eg. N--) & Spacing (mm)	16	200
"H"	Plinth Height (If Required) (mm) (Round To Nearest 10)	0	
"P"	Plinth Width (If Required) (mm)	0	
"T"	Trimmer Qty, Dia & Spacing (mm)	3 N12 @ 100	
	Holding Down Bolt Grade	4.6	
	Ultimate Base Moment (kNm)	25.8	
	Ultimate Base Shear (kN)	3.8	
	Working Base Moment (kNm)	17.2	
	Working Base Shear (kN)	2.6	



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Column Design Program

Slab Footing Foundation Notes

Product Description:	F12BM - 12M Medium Duty Fixed Tapered Octagonal Column	Product Location:	Wind Region A, Terrain Category 2

Drawing Dimensions

1. Dimension "A" denotes the "Pitch Circle Diameter" "PCD" of the H.D. bolts. This should match the bolt pattern on the column's baseplate.

2. Dimension "B" denotes the H.D bolt quantity, diameter and the minimum bolt embedment in the concrete.

3. Dimension "C" denotes the footing slab depth, whilst **Dimension "D"** provides the slab width and assumes the slab is square in shape.

4. Dimension "E" details the steel reinforcing cage length. This steel reinforcing cage will be specified when the footing requires a plinth and the cage will protrude into the plinth and provide the steel reinforcing for the plinth. **Dimension "F"** denotes the "Pitch Circle Diameter" "PCD" of this cage.

5. Dimension "S" details the diameter and spacing (centre to centre) of the top and bottom steel reinforcing.

6. If the footing does not have a plinth, **Dimensions "H" & "P"** in the above chart will be left blank and there will be no plinth reinforcement. Where a plinth is required, a cylindrical cage will be supplied which shall sit on the bottom steel and protrude through the top steel into the plinth with the adequate concrete coverage of 75mm to the top of the plinth and 100mm on the sides as per the diagram above.

7. Dimension "T" denotes the steel reinforcing trimmer quantity,, diameter and spacing. These reinforcing bars run around the four vertical sides of the foundation and tie in with the cogs of the top and bottom steel reinforcing bars "S" above.

General

1. All dimensions relevant to setting out and off-site work must be verified by the builder or installation contractor before construction is commenced.

2. The above drawings shall not be scaled.

3. During construction, the builder or installation contractor shall be responsible for maintaining the structure in a stable condition and ensuring no part is overstressed during construction activities.

4. All workmanship and materials are to be in accordance with the relevant Australian Standards and the local statutory authorities' regulations including all amendments, except where varied by contractual documents.

5. The minimum spacing to the H.D. bolts is to be 200mm. If the spacing is less than 200mm, the matter should be referred to a qualified engineer.

6. Electrical conduit diameter to be as per builder's requirements and the use of long sweep conduit bends are recommended.

7. The top of the slab should have a 5 degree slope from the centre to allow for surface drainage.

8. If possible, cast in the slab footing a 20mm drain pipe level with the top of the slab as per the diagram above.

9. The consulting engineer has not designed and is not responsible for the structural elements other than shown on the engineering drawings.

10. The above footing design is based on fine soil conditions as defined in AS/NZS 4676:2000. For all other foundation conditions, the site must be approved by a qualified Geotechnical Engineer and an appropriate footing designed accordingly.

11. Minimum concrete coverage to the top, bottom and sides of slab to be 75mm unless otherwise specified by a qualified engineer.

12. If in doubt, the builder or installation contractor must engage an experienced and qualified civil / structural engineer to confirm the soil conditions and determine a suitable slab footing size.

Site Preparation

1. The site shall be stripped of all vegetation or organic matter at the building area.

2. Ensure that no residual vegetation or organic matter exists in the soil strata directly below the footing for a depth of at least 1200mm.

3. The ground to the underside of the footing on the ground shall be compacted with an approved vibratory plate compactor to achieve a compaction in the top 600mm equivalent to a minimum of 6 blows per 300mm measured with a 16mm diameter 9.1Kg sand penetrometer as per AS1289.6.3.3-1997.

4. If the site is fill, all fill shall be compacted in layers not exceeding 450mm thickness. Any imported fill shall be clean well graded yellow sand from an approved source.

5. If the soil conditions are poor including clayey soils, the site should be inspected by a qualified civil / structural engineer and site preparation shall be as per the engineer's recommendations.

6. If there are small soft spots, they shall be removed and replaced with fine crushed rock or compacted sand or concrete.

7. The footing excavation shall be maintained in a dry condition until the concrete is poured. Any material softened by water shall be removed and replaced as per the soft spots in No 6 above. Ensure that soil does not fall in during placement of concrete.

8. If the excavation exposes the water table, the builder or installation contractor must seek the advice from a qualified and experienced civil / structural engineer regarding suitability. The above footing design does **not** account for the presence of the water table above the bottom of the footing.

9. Where the existing ground is soft rock, maintain the excavation in a dry state.

10. Where the existing ground is hard rock, the site should be inspected by a qualified engineer prior to excavation.

11. The responsibility of defining the existing soil conditions rests with the builder or installation contractor, unless that responsibility has been assigned to a qualified and experienced civil / structural engineer.

Steel Reinforcing

1. If the installation site is less than 400 Mtrs from a coastal area, or it has soil with a high salt content, G&S recommend the reinforcing bars be hot dipped galvanized. For further notes please see the "Steel Reinforcing" section attached.

Concrete & Post Pouring

Please see the "Concrete Specifications" section attached.

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Column Design Engineering

Steel Reinforcement *(AS/NZS 2159 & AS/NZS 3600)*

Product Description:	**F12BM - 12M Medium Duty Fixed Tapered Octagonal Column**	**Product Location:**	**Wind Region A, Terrain Category 2**

1. Reinforcement symbols (All reinforcing to comply with AS4671):

R: Denotes structural Grade 250 plain round bar to AS4671.

N: Denotes hot rolled Grade 500 deformed (ribbed) bar ductility class N to AS4671.

L: Denotes hot rolled Grade 500 deformed bar ductility class L to AS4671.

SL: Denotes hard drawn wire Grade 500 square reinforcing mesh ductility class L to AS4671.

RL: Denotes hard drawn wire Grade 500 rectangular reinforcing mesh ductility class L to AS4671.

W: Denotes grade 500 steel reinforcing wire AS4671.

2. The number following is the bar diameter in (mm).

3. The builder shall supply all necessary bar chairs (plastic tipped), support and spacer bars, and concrete blocks for footing and slab reinforcement, to place steel in it's correct position during concreting.

4. The hold down bolts or bolt cage is to be placed centrally within the pile and a maximum of 150mm above the base of the pile.

5. Cover to reinforcement: 75mm all round (concrete well liner included). this cover is adequate for all situations other than exposure classifications "C" and "U" as defined in AS3600. (Class "U" applies to members exposed to aggressive soils and Class "C" applies to members exposed to water in tidal or splash zones.)

6. Ligatures shall be provided around the outside of the entire length of the longitudinal reinforcement as follows:

a) for pile diameters up to and including 750mm, an R6 spiral or hoop ligature at 200mm pitch shall be used;

b) for pile diameters 750mm and above, an R10 spiral or hoop ligature at 300mm pitch shall be used.

All spiral ligatures shall have 2 full turns at the top and bottom.

7. All steel bars are to be 500 plus rebar and are to conform to the requirements of AS4671 steel reinforcing materials.

8. Splices in reinforcement shall be made only in the positions shown or as approved by the engineer. Minimum laps in slabs shall be:

N12-400mm NY16-500mm
N20-600mm SL81-250mm
or as noted on the drawings.

9. Reinforcement in slabs must be placed in upper and lower layers as indicated. Cogs and hooks to be standard in accordance with AS3600.

10. If the installation site is less than 400 Mtrs from a coastal area, or it has soil with a high salt content, G&S recommend that the reinforcing bars be hot dipped galvanized.

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Column Design Engineering

Concrete Strength (AS/NZS 2159 & AS/NZS 3600)

Product Description:	**F12BM - 12M Medium Duty Fixed Tapered Octagonal Column**	**Product Location:**	**Wind Region A, Terrain Category 2**

Exposure Classification	Concrete Strength (f'_c) MPa	Minimum Cover (mm)
Non - Aggressive	32	65
Mild	32	65
Moderate	40	65
Severe	50	70

Location	Strength Grade	Aggregate Size (Max)	Slump Nominal (mm)
Footings Standard Soils	32	20	80
Footings - Aggressive Soils	40	20	80
Blinding (Slab Footing Only)	20	20	100

1. All workmanship and materials shall be in accordance with AS3600 - (current edition with amendments), except where varied by the contract documents.
2. All concrete shall be pre-mixed from an approved supplier. Portland cement type A to be used. Blended cement not to be used.
3. Table above indicates strength grades.
4. All concrete is to placed and vibrated to optimum compaction.
5. Concrete shall be cured for a minimum of 7 days prior to installing the pole, by one of the following methods:
   (a) an approved curing compound, or
   (b) continuous water sprays for periods, or
   (c) the surface shall be thoroughly moistened and covered completely with plastic sheet securely held in position.
6. All concrete is to have a 28-day characteristic comprehensive strength (f c) of 32MPa, unless otherwise noted in the above table.
7. The maximum aggregate size shall be 20mm, with 80mm slump.
8. Water is not to be added to concrete after batching and if necessary, chemical additives are to be used to alter the consistency of the concrete, providing they do not reduce the specified concrete compressive strength.
9. Ensure that sides of excavation are such that soil does not fall in during placement of concrete.

Pile Footing (Specific)
Filling of piles is to take place as soon as possible after drilling. Piles are not to be left overnight before concreting.

Slab Footing (Specific)
a) Surface shall be thoroughly moistened and covered completely with plastic sheet securely held in position, or
b) Continuous water sprays for periods, or
c) An approved curing compound.

Ensure that sides of footing trenches are such that soil does not fall in during placement of concrete. On boundary lines sides of footings shall be formed up with timber. Slab finish to top surface - (wood float).

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Column Design Engineering

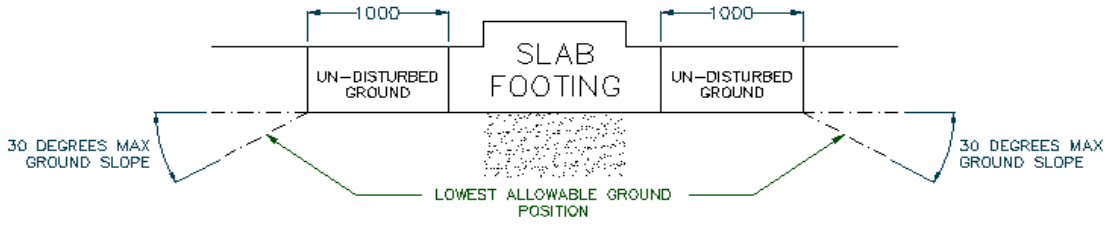
Soil Classification *(AS/NZS 4676, Appendix I)*

Product Description:	**F12BM - 12M Medium Duty Fixed Tapered Octagonal Column**	**Product Location:**	**Wind Region A, Terrain Category 2**

Class	**Very Soft**	***Soft***	***Firm***	***Very Firm***	**Hard**
Soil Description	Silty clay and sand; loose dry sand	Wet clay; silty loam; wet or loose sand	Damp clay; sandy clay; damp sand	Dry clay; clayey sand; coarse sand; compact sand	Gravel; dry clay
Strength (f_b) kPa at serviceability limit state	f_b=< 60	60<f_b=<100	100<f_b=<150	150<f_b=<240	240<f_b

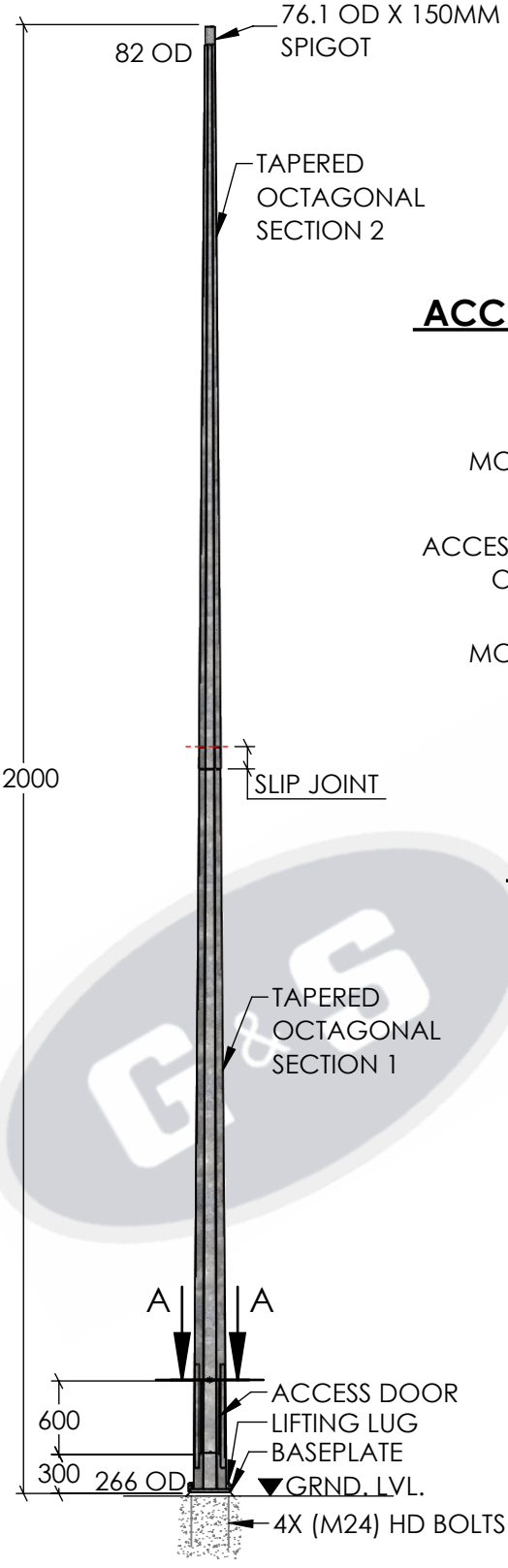
Aggressive soils shall include soils where ph:<4.0, soils where groundwater contains high concentrations of sulphate ions, or salt rich soils, this matter should be referred to the engineer.

This program applies to sites limited to the following geometry for slab footings:



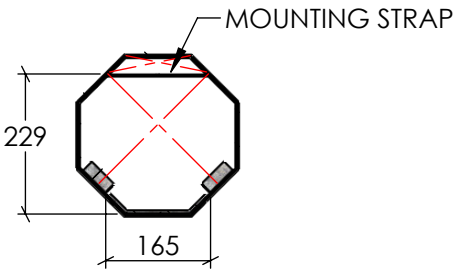
f_b = permissible bearing strength of a foundation material at the serviceability limit state

f_{bu} = permissible bearing strength of a foundation material at the strength limit state = 1.5 f_b



FRONT ELEVATION

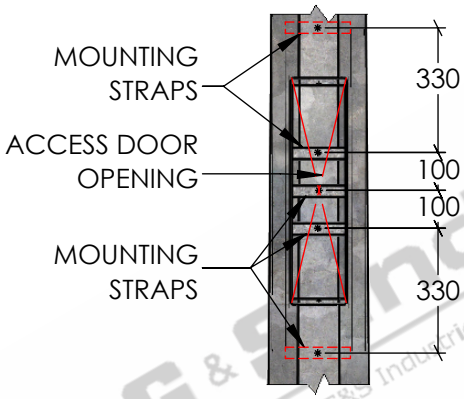
SCALE 1:60



SECTION A-A

ACCESS DOOR CLEARANCE DETAIL

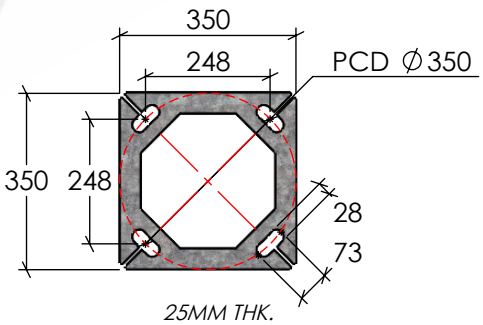
SCALE 1:12



*DOOR REMOVED FOR CLARITY

ELEVATION ON DOOR

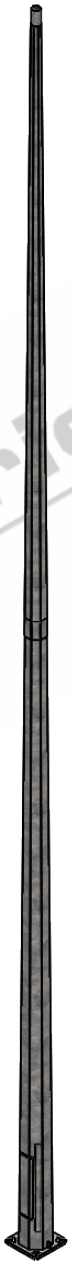
SCALE 1:15



25MM THK.

BASEPLATE DETAILS

SCALE 1:15



ISOMETRIC VIEW

SCALE 1:60

STANDARDS

ALL PRODUCTS TO CONFORM TO THE FOLLOWING AUSTRALIAN STANDARDS.

* AS 1170.2 Structural design actions - Wind actions.
* AS 1554(set) Structural steel welding set.
* AS 2159: Piling - Design & Installation.
* AS 2870: Residential slab footings - Construction.
* AS 3600: Concrete structures.
* AS 3678: Structural steel - Hot rolled plates, floorplates and slabs.
* AS 4680: Hot dip galvanized (Zinc) Coatings on fabricated ferrous articles.
* AS/NZS 4671: Steel reinforcing materials.
* AS/NZS 4600: Cold formed steel structures.

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SCALE: AS SHOWN | PRODUCT WEIGHT: 192kg.

PRODUCT FINISH: HOT DIPPED GALVANIZED

CUSTOMER APPROVAL :

CUSTOMER NAME / PROJECT :

	NAME	DATE
DRAWN	N. A.	14.10.2022
CHECKED	S. G.	14.10.2022
APPROVED	R. G.	14.10.2022

PART NUMBER : **F12BM**

TITLE :

12M MEDIUM DUTY FIXED BASE MOUNTED TAPERED OCTAGONAL POLE

SIZE A4 | DWG. NO. ZLRG2046CA | REV. 0

SHEET 1 OF 1