Prepared for:	Shire of Merredin
Attention:	CEO: Craig Watts (ceo@merredin.wa.gov.au) Executive Manager Development Services: Peter Zenni (emds@merredin.wa.gov.au)
Date:	14 February 2025
Site Location:	Site reference: RCP3-011-D (Korbel Site) Address: Lot 17079 on DP142485 accessed via Korbelka Road, Merredin WA 6415

Commercial in Confidence

Vision Statement

To be the first choice for broadband internet in regional Western Australia by providing first-class infrastructure with a consistent focus on excellent customer service and ongoing regional community consultation to ensure our program meets the needs of regional WA.

Background

CRISP Wireless is a Network owner/operator licensee for Wireless Broadband services in Western Australia.

We provide a unique telecommunications solution that utilises Point-to-Point secured wireless connectivity between sites as well as community wireless services and subscriber broadband.

Quality Information

Prepared for:

Korbel Site (RCP3-011-D)

Prepared by:

CRISP Wireless Pty Ltd

Address: [redacted]

Email: [redacted]

Document number:

Revision	Revision Date	Details	Authorisation		
			Prepared By	Reviewed By	Authorised By
A	14/02/2025	Proposal	Heidi Cowcher	Leigh Ballard	Leigh Ballard

Proposal

CRISP Wireless proposes extending our fixed wireless network across the Wheatbelt. We are proposing to build a 30m communications tower at Lot 17079 on DP142485 accessed via Korbelka Road, Merredin. This proposed tower is part of a wider network across the region that is being established to improve the telecommunications connectivity for Wheatbelt-based residents.

An agreement has been entered into with the landowner for the installation of this telecommunications infrastructure to be located on the subject land in the form of a 30m telecommunications tower; together with a container to house the communication equipment with solar panels on top for power provision.

The development application is made in accordance with the *Planning and Development Act 2005* for assessment under the Shire of Merredin Town Planning Scheme 6. The subject land is in the General Farming Zone.

The proposed work shall be referred to as *Telecommunications Infrastructure* for the purposes of this development application. The site proposed will not affect, nor impact, current farming practices. The site can be fenced should the landowner require it as part of the access agreement.

Under the TPS, the Zoning tables specify the uses permitted in various zones. The permissibility of any use is determined by considering the zoning table and cross-referencing it with the proposed works. The installation of telecommunications infrastructure is 'D' under the zoning table and is therefore only permitted at the discretion of the Council, as the Council are required to determine the planning approval or otherwise.

A summary of the subject land is provided in the below table:

Address of subject land	17079 / DP142485
Real Property Description	Lot 17079 on DP 142485
Area of Subject Land	291.3134 ha
Existing buildings on Subject Land	Farming related infrastructure
Road Frontages	Korbelka Road
Zone	General Farming Zone
Overlays	Bushfire Prone Area, Native Vegetation
Landowners	Christopher James Hooper
Easements/Encumbrances	Nil

The site is highlighted on the following maps:

Fig 1: Shire of Merredin Town Planning Scheme 6 (Map 11 Korbel townsite)
Source: Shire of Merredin

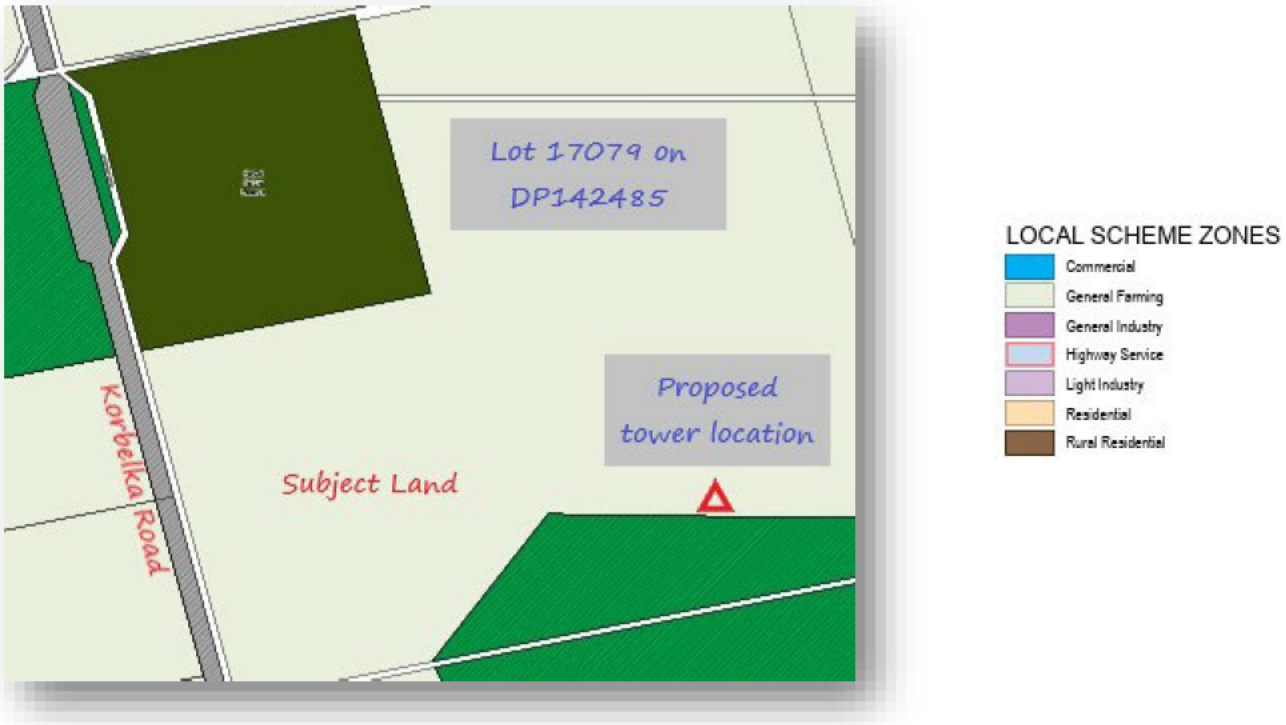


Figure 2: Map of Bushfire Prone Area (*Source: Landgate SLIP*)

Figure 3: Native Vegetation Extent *(Source: DPIRD WA Remnant Vegetation Mapping)*

The telecommunications infrastructure will consist of the following:

- A 30m steel tower as shown in **Attachment 5.**
- A combination of Dual Pole Parabolic Antennas (Dishes) and Sector Antennas as shown in **Attachment 6.**
- A sea container housing the communications equipment; and
- Solar panels to power the system on the roof of the sea container.

The tower will be approximately 25m from the southern boundary of the subject land as shown in the Site Plan in **Attachment 4**. The tower and associated infrastructure will occupy an area of approximately 400m$^{2.}$ The site does not require fencing, however, if requested, we will undertake to complete this.

The subject land is located within the mapped remnant vegetation; however, no vegetation clearing is required for the construction of the tower.

Access to the site will be via Korbelka Road via an internal all-weather farm access track through the property as shown in the Site Plan. Access to the site during construction will amount to one semi-trailer accessing the site on one occasion (total of two 'movements' – one in and one out); followed by one six-wheeler Hiab accessing the site on one occasion (total of two 'movements' – one in and one out); and then lastly one commercial ute on two occasions (total of four 'movements' – two in and two out) – with construction anticipated to take two days.

At the completion of construction, it is highly unlikely that the applicant will be required to access the site for ongoing maintenance as much can be undertaken via the remote access software by our experienced and qualified technicians. However, if a need arises, it will be by a light vehicle (commercial ute) and would be on one occasion (total of two 'movements' – one in and one out). It is not proposed to establish formalised parking given the very infrequent nature of the access required to the tower once construction is complete and the tower is 'live'.

Please refer to the attached Site Plan in **Attachment 4** showing the location of the proposed tower and associated infrastructure, the proposed access location and the access pathway.

As the proposed tower is for wireless broadband only and does not transmit electromagnetic waves/fields to mobile phones, therefore it does not emit electromagnetic radiation and does not require an Environmental EME (Electromagnetic Energy) Report to be prepared or provided to support the development application.

Figure 4: Photo of Tower and Communication Hut (Source: CRISP Wireless)

Planning Scheme and other Legislation

The Planning Scheme

The proposed use will be assessed against the Shire of Merredin Town Planning Scheme 6 (*the Planning Scheme*). The Zoning Scheme provides a definition for the proposed use as follows:

"telecommunications infrastructure: *means premises used to accommodate the infrastructure used by or in connection with a telecommunications network including any line, equipment, apparatus, tower, antenna, tunnel, duct, hole, pit or other structure related to the network."*

The proposed telecommunications tower and associated infrastructure are consistent with the definition.

The subject land is located in the General Farming Zone and the Zoning Table in the Planning Scheme designates Telecommunications Infrastructure as 'D', a discretionary use requiring local government approval.

The Planning Scheme refers to the following objectives for the General Farming Zone:

- To provide for a range of rural pursuits that are compatible with the capability of the land and retain the rural character and amenity of the locality.
- To protect land from urban uses that may jeapordise the future use of the land for other planned purposes that are compatible with the zoning.
- To support sustainable farming practices and the retention of remnant vegetation.
- To prevent any development that may affect the viability of a holding.
- To encourage small-scale, low-impact tourist accommodation in rural locations.
- To encourage a diversification of rural activities that will reduce the dependency of the rural sector on traditional crops.
- To support the creation of homesteads lots in accordance with adopted Local Planning Policy.
- To support mining activities where an environmental management plan has been prepared and is acceptable to the local government and the Environmental Protection Authority.
- To preclude the disposal of used tyres or any other material that may be detrimental to the quality of the land.

The proposed development is not anticipated to have any detrimental impacts on the abovementioned objectives of the General Farming Zone as specified in the Planning Scheme. The development is considered relatively minor in nature and takes into consideration all sensitive land uses and potential

environmental impacts that could occur. The development is located in an area that will not impede broad-acre agricultural uses, such as cropping and grazing. The development is also considered beneficial to landholders in its vicinity due to the significant improvement in connectivity that is offered as a direct result.

Section 64 of Schedule 2 Deemed provisions for local planning schemes of the Planning and Development (Local Planning Schemes) Regulation 2015 requires the advertising of complex applications for development approval.

The proposed tower will not have any detrimental effects on the existing land use (farming) and will be located outside of the useable cropping land and it is amenable to, and of direct benefit to, the landowners in the area. Access to a wireless broadband service is a game changer in lots of respects and will significantly improve digital accessibility.

State Planning Policy 5.2 – Telecommunications Infrastructure

The intent of State Planning Policy 5.2 – Telecommunications Infrastructure is to "balance the need for effective telecommunications services and effective roll-out of networks, with the community interest in protecting the visual character of local areas".

As stated in the Policy, adequate and reliable telecommunications are essential for all aspects of contemporary community life, from supporting the State's economy to creating and maintaining connected and cohesive social networks. Contact between emergency services and the community increasingly relies on telecommunications networks. The importance of telecommunications services in Western Australia is recognised in the Western Australian Planning Commission's (WAPC's) State Planning Strategy 2050 (2014), which advocates for the provision of an effective state-wide telecommunications network. This network includes both above and below-ground infrastructure to support both fixed-line and wireless telecommunications.

The proposed development provides a wireless broadband network through line-of-site towers and complies with the intent of the Policy. Sites for telecommunications facilities are chosen for elevation, distance to other towers and ease of access. In this case, the facility is set well away from roads and sensitive receptors and is unlikely to affect visual amenity.

Therefore, the proposal is consistent with the principles set out in the Policy and can be balanced with the need for effective telecommunications services.

State Planning Policy 3.7 – Planning in Bushfire Prone Areas

Part of the subject land, and the location of the proposed telecommunications facility, has been identified in the SLIP mapping as being within a Bushfire Prone Area, as shown in Figure 2 above. The intent of the SPP is "to implement effective, risk-based land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure".

Sites for telecommunications facilities are chosen for elevation, distance to other towers and ease of access. While the proposed facility is located in a bushfire-prone area, the development does not result in an increase in residents or employees, nor does it increase the bushfire threat. CRISP employees have a duty of care to ensure that any access to landowners' properties is undertaken in a manner so as to not cause a bushfire risk. As a business, we ensure that we remain up to date at all times of bushfire risks, harvest and vehicle movement bans in the areas where we are working, and any other restrictions imposed at a local or state level, and will always adhere strictly to these as imposed, especially during the peak fire season.

Accordingly, a bushfire assessment has not been carried out given the above.

Conclusion

The proposed development of a telecommunications facility will provide a much-needed service to the local community. The location of the proposed tower is set well back from the road and will not impact the privacy or visual amenities of the local residents.

The subject land is suitable for a telecommunications tower for the following reasons:

- ✓ The site has a direct line of site to other proposed towers in the region and across the network.
- ✓ The site has safe access, and the development will not create a nuisance to current traffic volumes and usage.
- ✓ The subject land is not flood-prone.
- ✓ The development will not increase the threat of bushfires or put lives in danger.
- ✓ The proposed location has not been identified as containing native vegetation or Aboriginal artefacts.
- ✓ The proposed facility will not interfere with agricultural land; and
- ✓ Potential impacts are low.

Therefore, the Council can be confident in approving the telecommunications facility as it will satisfy an essential community need.

Attachments

Attachment 1	Application for Local Government Development Approval
Attachment 2	Owner's Consent
Attachment 3	Certificate of Title
Attachment 4	Site Plan
Attachment 5	Example Tower Technical Drawings
Attachment 6	Antenna Infrastructure

SHIRE OF MERREDIN
HEART OF THE WHEATBELT

Attachment 1

APPLICATION FOR PLANNING APPROVAL

LOCAL PLANNING SCHEME No. 6 - SCHEDULE 6 - (CLAUSE. 9.1.1)

OWNERS DETAILS			
Name/s:	[redacted]		
Address:	[redacted] South Doodlakine WA		
			Post Code: 6418
Phone work:		Phone home:	Fax:
Mobile:	[redacted]	Email: [redacted]	
Signature:	Please refer to attached landowner consent	Date:	12/02/2025
Signature:		Date:	

NB: The owner/s signature/s are required for your application to be processed.

APPLICANTS DETAILS			
Name:	CRISP Wireless Pty Ltd		
Address:	[redacted] Narrogin WA		
			Post Code:
Contact person for correspondence:	Leigh Ballard		
Phone work:	6809 2100	Phone home:	Fax:
Mobile:	[redacted]	Email: [redacted]	
Signature:		Date:	

PROPERTY DETAILS			
Lot No:	17079	House/Street No:	Location No:
Street name:	accessed via Korbelka Road		
Suburb:	Korbel		Post Code:
Nearest street intersection:	Korbel West Road		
Diagram or plan:	142485	Certificate of title:	1439 Folio:
Title encumbrances (e.g. easements, restrictive covenants)	Nil		

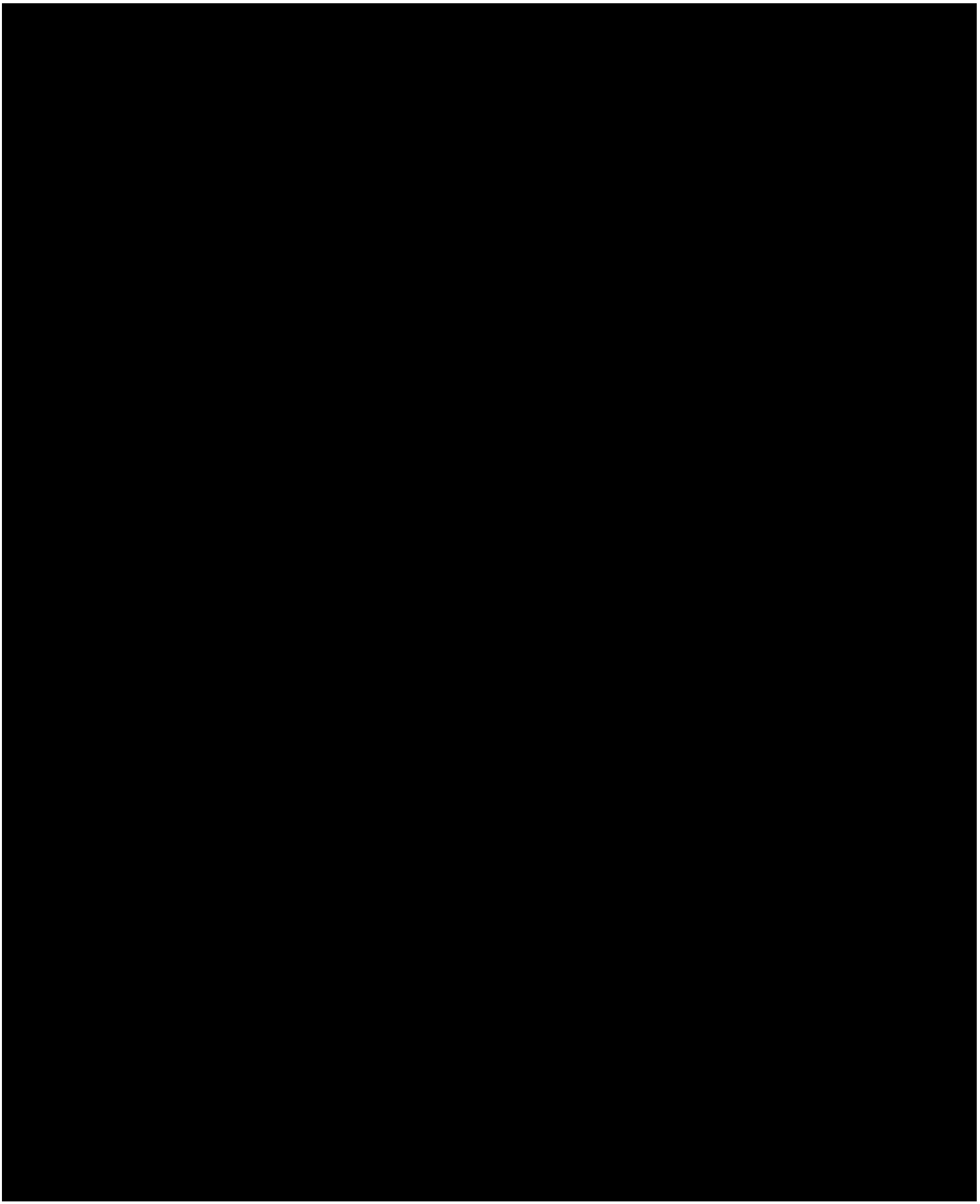
PROPOSED OR EXISTING BUILDING/LAND USE	
Description of proposed development and/or land use:	Telecommunications Infrastructure - Com Broadband & communications hut
Nature of any existing buildings and/or land use:	Agriculture - Extensive - ie: cropping & grazing
Approximate cost of proposed development:	$ 100,000
Estimated time of completion:	6-8 weeks from all approvals secured

OFFICE USE ONLY	
Acceptance Officer's initials :	*Date received:*
Local government reference no:	

Attachment 2: Landowner Consent

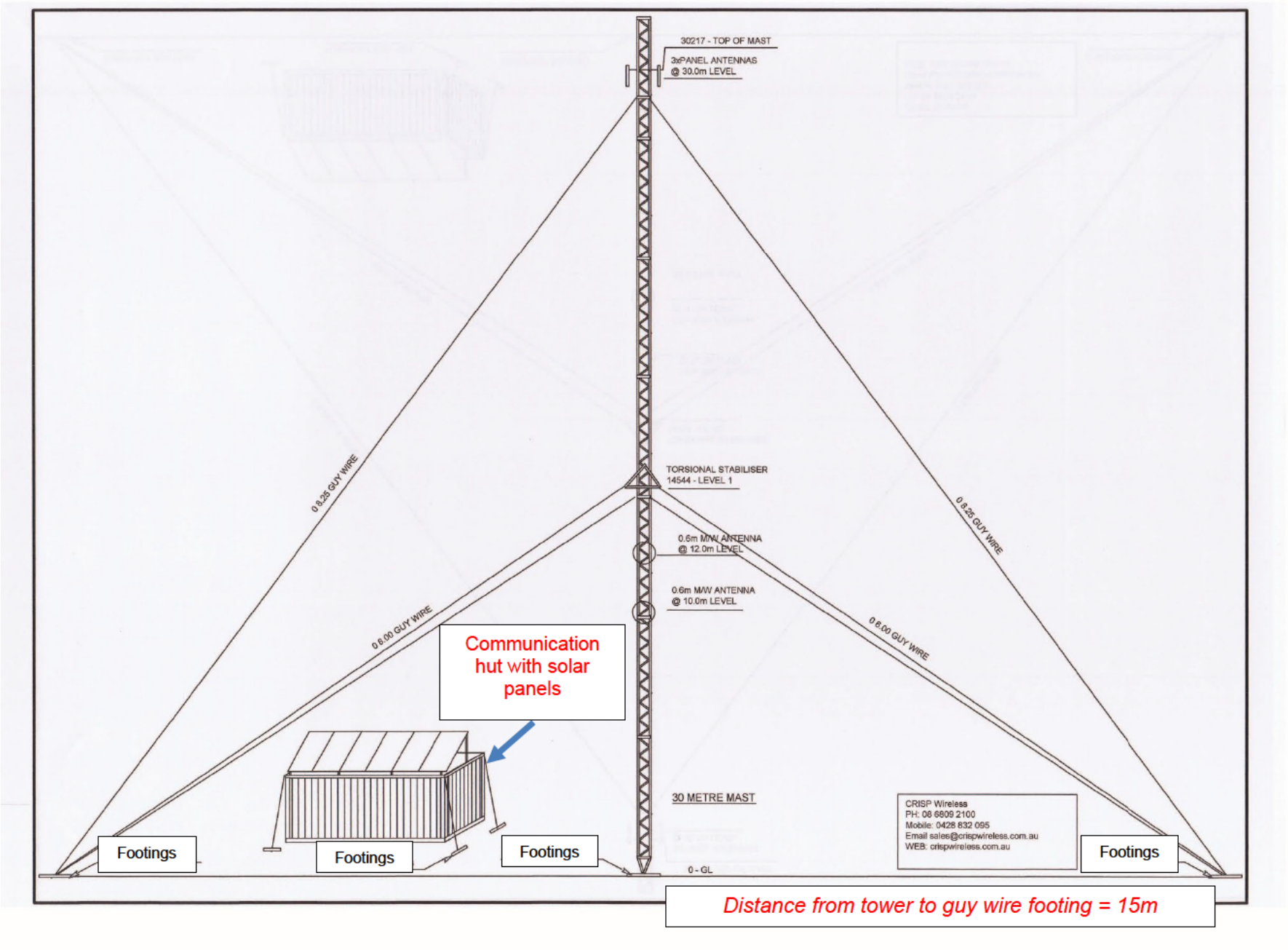
I, Christopher James Hooper, being the registered landowner of the premises identified as Lot 17079 on DP 142485 accessed via Korbelka Road, Merredin, consent to the submission of an application for Development Approval by CRISP Wireless Pty Ltd on the premises described above for the purpose of a Telecommunications Tower and associated infrastructure.

SIGNED



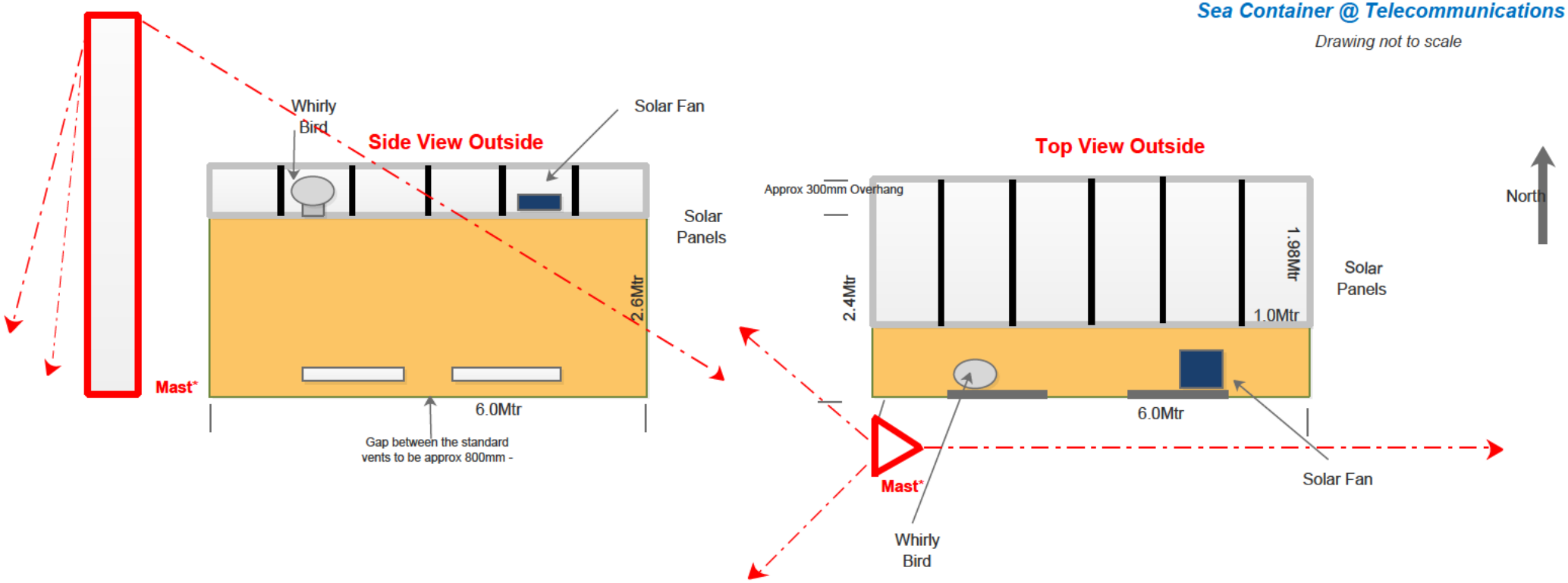
ATTACHMENT 4: SITE PLAN
KORBEL SITE
LOT 17079 ON DP142485
Accessed via Korbelka Road, Merredin

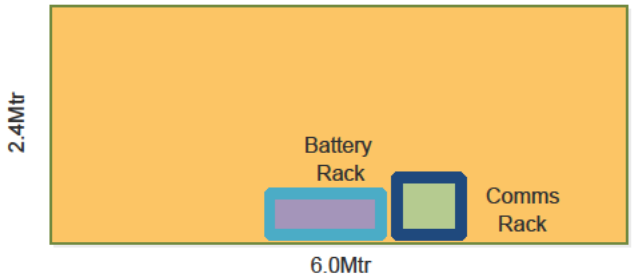
Attachment 5: Example Tower Technical Drawings



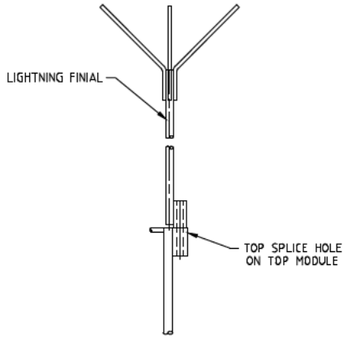
CRISP Wireless Pty Ltd
Sea Container @ Telecommunications Site

Drawing not to scale

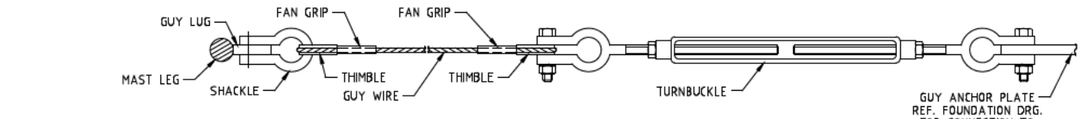




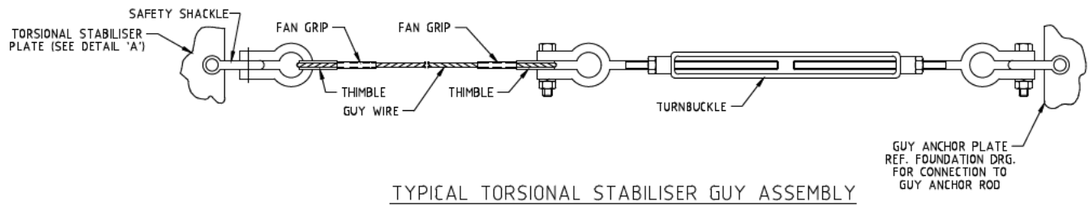
*Distance between mast and sea container not to scale.



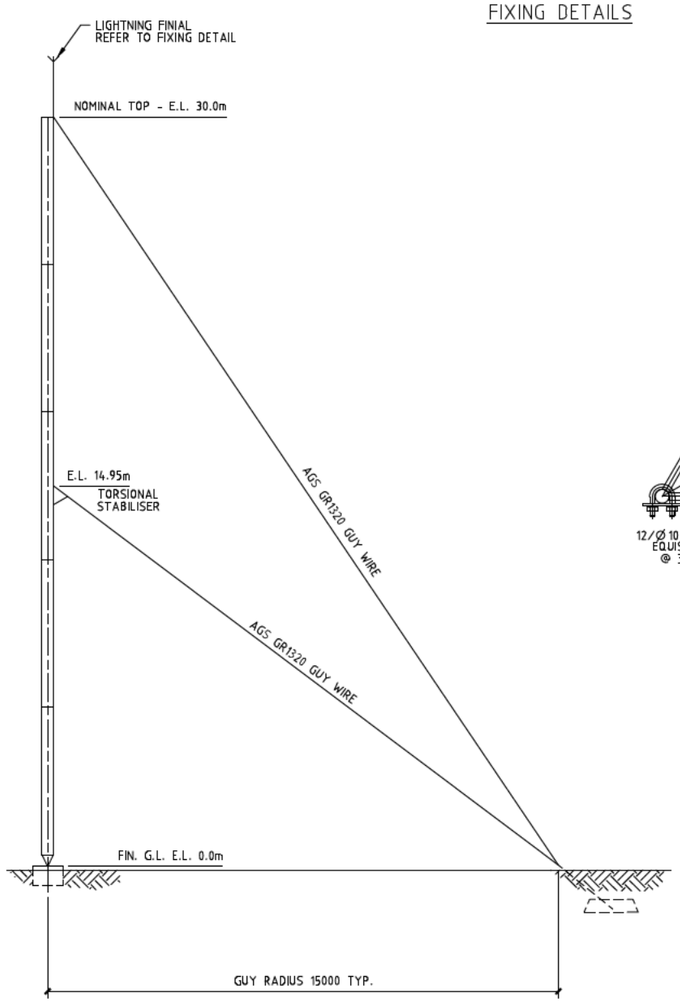
LIGHTNING FINIAL
FIXING DETAILS



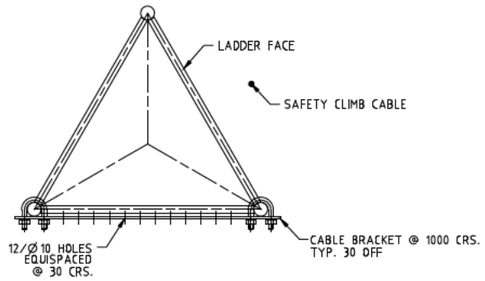
TYPICAL GUY ASSEMBLY



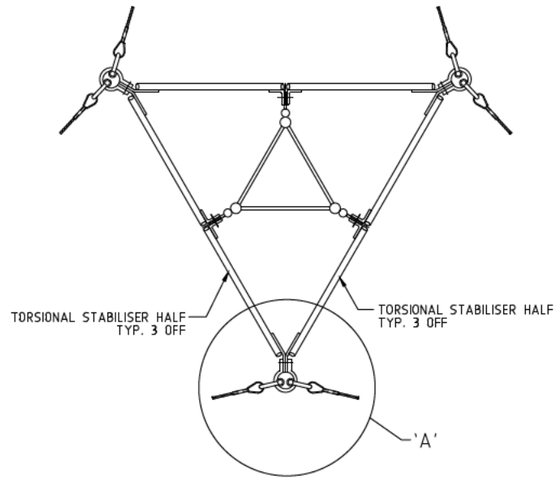
TYPICAL TORSIONAL STABILISER GUY ASSEMBLY



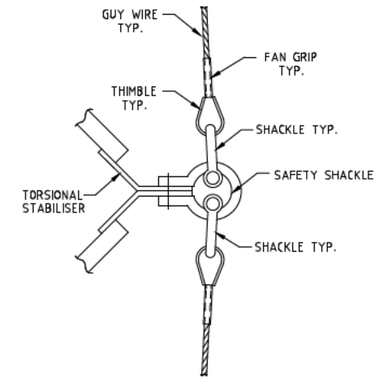
MAST ELEVATION



TYPICAL PLAN



PLAN AT TORSIONAL



DETAIL 'A'

GENERAL NOTES

1. REFER TO FEC STANDARD NOTES F1/1/SN.

DRG. No.	MK. No.	ITEM No.	No. OFF	DESCRIPTION	CUT LG.	MATERIAL/DRG. No.

MATERIAL LIST

FUTURE ENGINEERING & COMMUNICATION PTY LTD
29 Spencer Street, Cockburn Central WA 6164
Ph: +61 8 9417 4999 - Fax: +61 8 9417 5999
Email: admin@futureeng.com.au

INFORMATION ONLY
NOT TO BE USED
FOR CONSTRUCTION

REFERENCE DRAWINGS	REF	REVISION	DATE	APPr.
F1/1/SN	FEC STANDARD NOTES			

DRAWN:	ENG:	DATE :	REV.	SCALE :	DWG No. :	
MP		17-10-18		NTS	Q7436-F450	A1
CHECKED:	APPr.:					

30m F450 GUYED MAST
GENERAL ARRANGEMENT

FUTURE
ENGINEERING & COMMUNICATION

Future Engineering and Communication Pty Ltd ACN 050 840 321 as trustee
for the Future Engineering & Communication Unit Trust ABN 73 037 646 279
7 Tamara Drive Cockburn Central Western Australia 6164
Phone: +61 8 9417 4999 Facsimile: +61 8 9417 5666
Email: admin@futureau.com.au Web: www.futureau.com.au

STRUCTURE DESIGN CERTIFICATION

Structure Data

Structure Type: FEC Guyed Mast
Height: 30m
Job Number: J3903/3
Date: 31/01/2024
Client: Crisp Wireless

Site Details

Site Name						
Site ID						
Latitude						
Longitude						

Site Parameters

Wind loading standard: AS1170.2-2021
Wind region: A1*
Wind return period: 500 years*
Terrain Category: 2.00*
Topographical Multiplier, M_t: 1.17*
Wind Direction Multiplier, M_d: 1.00*

Structural design standards:

AS4100-2020, AS3995-1994 & AS3600-2018/Amdt1

Serviceability Criteria:

Maximum microwave rotation < 1° @ 27m/s

Antenna Loading Data (Height is measured from base of structure to centre line of antenna)

ID	Height AGL (m)	Antenna Type	Azimuth (°)	Effective area (m^2)	Feeder cable	Status (P/E)	Carrier
1	31.00	Lightning Finial	-	0.100*	-	P	-
2	30.00	4 x 800mm x 150mm Panels	-	0.720*	-	P	-
3	28.00	1 x Omni	-	0.100*	-	P	-
4	27.00	Future Allowance	-	0.500*	-	P	-
5	18.00	1 x Ø600mm M/W	-	0.503*	-	P	-
6	17.00	1 x Ø600mm M/W	-	0.503*	-	P	-
7	16.00	1 x Ø600mm M/W	-	0.503*	-	P	-

Ancillary Loading Data

Tower Access: Climbing on mast face c/w safety climb.
Feeder Arrangement: External feeder brackets on mast face.

FUTURE
ENGINEERING & COMMUNICATION

Future Engineering and Communication Pty Ltd ACN 050 840 321 as trustee
for the Future Engineering & Communication Unit Trust ABN 73 037 646 279
7 Tamara Drive Cockburn Central Western Australia 6164
Phone: +61 8 9417 4999 Facsimile: +61 8 9417 5666
Email: admin@futureau.com.au Web: www.futureau.com.au

Work covered by this certificate:

Design & certification of 6 x 30m guyed masts and associated guy attachments.
Design & certification of 1 x new antenna mount.
Foundation design by others and excluded from this certification.

Work Specified on the following document's:

FEC Drawings: J3903/1/3
J3903/2/AM

Foundation Reactions:

Mast Base: Compression = 85.35 kN
Shear = 4.04 kN
Guy Anchors: Horizontal = 38.63 kN
Uplift = 30.00 kN

Prepared by: Tom Wang

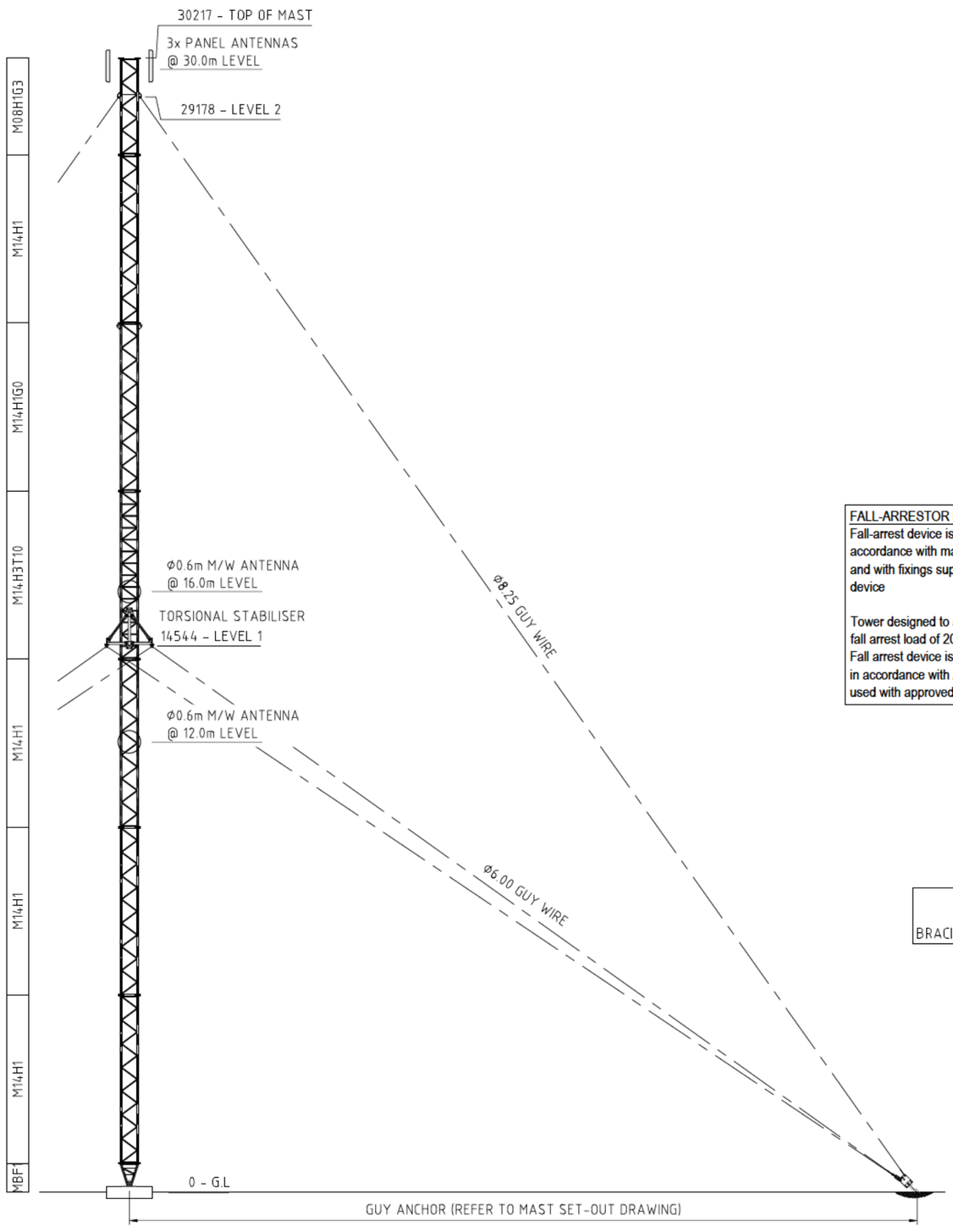
Approved by:

Chartered Professional Engineer 4397535
Mladen Kovacevic
MIEAust CPEng NER
ENGINEERS AUSTRALIA
Signatu[redacted] Date: 31/08/22

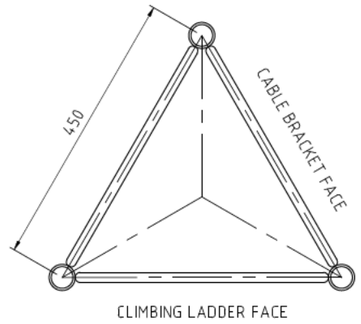
On behalf of: Future Engineering & Communication Pty Ltd.

Note

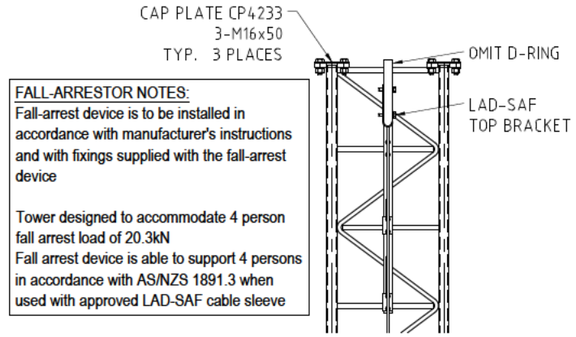
- Analysis is based on information provided in client supplied data unless shown by "*". See FEC Basis of Structural Review Document FE275 attached.
- This certificate does not Cover anything other than the structure and foundation described above. Eg. Existing headframe, mounting frames, antenna mounts, cable trays, etc. are not covered



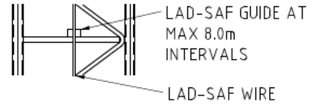
DIAGRAMMATIC MAST ELEVATION

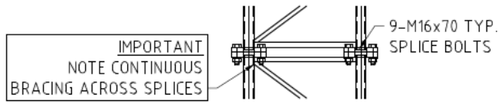


TYPICAL MAST PLAN VIEW

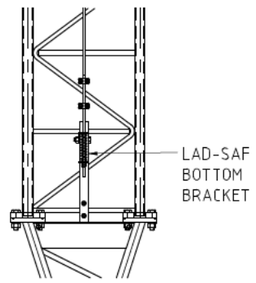


LAD-SAF TOP BRACKET





TYPICAL MAST SPLICE



LAD-SAF BOTTOM BRACKET

HARDWARE SCHEDULE				
SIZE	QTY	DESCRIPTION	GRADE/FINISH	SUPPLIED BY
M16x70	66	HEX HEAD BOLT + NUT & FLAT WASHER	GRADE 8.8 GALV	ROAM
M16x50	9	HEX HEAD BOLT + NUT & FLAT WASHER	GRADE 8.8 GALV	ROAM
6116633	1	TOP & BOTTOM BRACKET - RUNG SYSTEM	LAD-SAF	ROAM
6100400	3	GUIDE BLOCK	LAD-SAF	ROAM
LS030-GALV	1	30m PRE-SWAGED CABLE	LAD-SAF	ROAM
SIGN	1	1.2mm Aluminium 83 x 142mm	ROAM SIGN	ROAM

BOLTED CONNECTION NOTES:

1. All bolts to be fitted with nut and flat washer unless spring washer is specified and supplied.
2. All U-bolts to be fitted with 2 nuts on each arm
3. All bolts are to be fitted with a minimum of 2-threads protruding past the nut.
4. All slotted holes to be fitted with flat was ers on both sides of bolted ply.
5. All bolts to be snug tightened to AS4100 bolting category 4.6/S or 8.8/S.
6. Bolts designated with the notation "XS" shall have bolt thread excluded from intersecting any internal ply shear plane. XS bolt length is critical.
7. A second nut, or lock-nut, shall be fitted whenever two or more ply cannot be bolted together without eliminating a gap between them.

IMPORTANT CONSTRUCTION SAFETY NOTE:

Roam supplies steelwork for others to erect based upon a clear understanding that steelwork will be erected by suitably competent and qualified personnel working in accordance with a safety plan that has been prepared in conjunction with a competent erection supervisor. The safety plan is expected to include a comprehensive job hazard analysis covering an assessment of lifts by cranes, winches ginpoles and juries, safe lifting of partly assembled modules, temporary lifting points and temporary removal of components during strengthening works as applicable to the job. Where a Safety in Design drawing has been provided, the Safety Plan for construction works should incorporate design hazards, design control measures and notes to the Constructor.

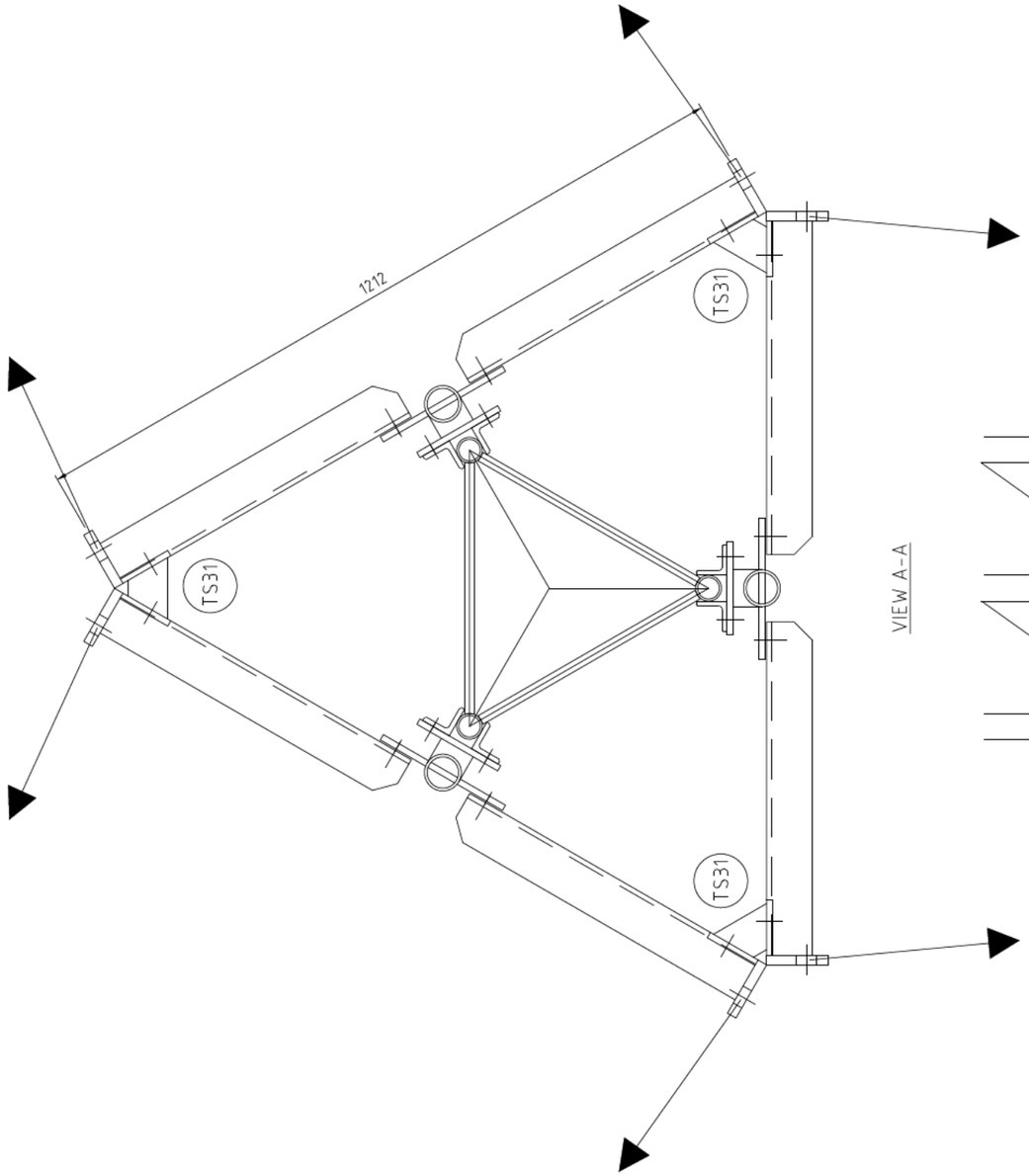
STD	CP4233	3	CAP PLATE	Ø138		
RJ12745	M08H1G3	1	MAST MODULE W/ GUYS	2586		
RJ12745	M14H3T10	1	MAST MODULE WITH T/S	4476		
RJ12745	M14H1G0	1	MAST MODULE W/ GUYS	4476		
RJ12745	M14H1	4	STD MAST MODULE	4476		
RM450	MBF1	1	MAST BASE	600		
DRG	COMPONENT	QTY	DESCRIPTION	LENGTH	MATERIAL	GRADE

TOTAL QTY = 10 COMPONENT SCHEDULE

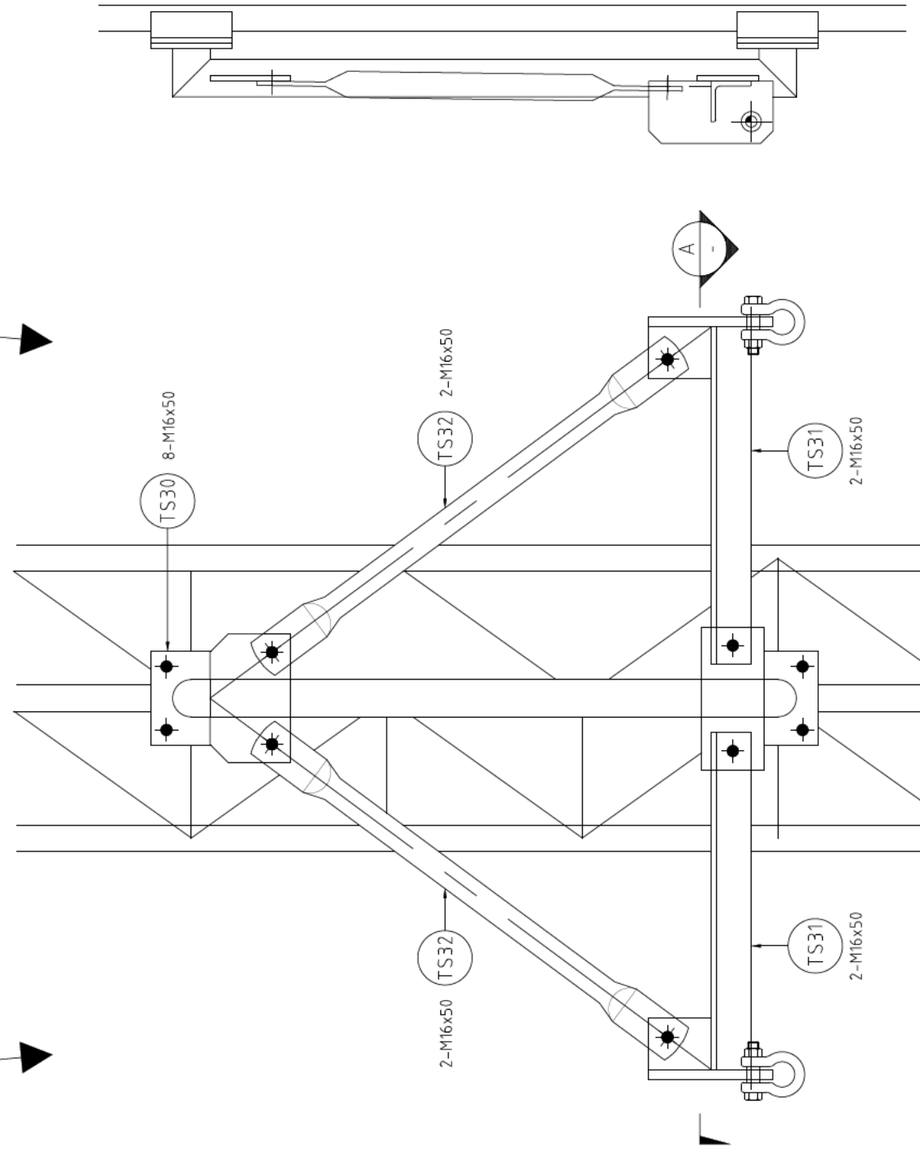
REFERENCE DRAWINGS		REF	REVISION	BY	DATE
RJ12748-4-SD1	SAFETY IN DESIGN ANALYSIS	C	JOB SPECIFIC MODULES	D.T	04-01-21
RJ12748-2-TS1	TORSIONAL STABILISER	B	ISSUED FOR CONSTRUCTION	C.J.C	16-12-20
RJ12748-2-GM1	GUYED MAST ERECTION NOTES	A	ISSUED FOR REVIEW	D.T	15-12-20
RJ12748-2-GW1	GUY WIRE ASSEMBLY				
RJ12748-3-1	MAST SET-OUT				

ROAM PTY LTD
8 MEKA STREET
MALAGA W.A. 6090 AUSTRALIA
TEL (618) 9248 4950 FAX (618) 9248 4951

DESIGN: C.J.C	DATE: 15-12-20	CRISP WIRELESS	
APPR: C.J.C	DATE: 16-12-20	30m RM450 GUYED MAST - TOWER D NN	
DRAWN: D.T	DATE: 15-12-20	GENERAL ARRANGEMENT	
SCALE: (A3) N.T.S	DWG. No. RJ12748-1-1	VER. -	REV. C



VIEW A-A



ELEVATION

HARDWARE SCHEDULE

SIZE	QTY	DESCRIPTION	GRADE/FINISH	SUPPLIED BY
M16x50	42	HEX HEAD BOLT + NUT & FLAT WASHER	GRADE 8.8 GALV	ROAM

DRG	QTY	DESCRIPTION	LENGTH	MATERIAL	GRADE
RM450	6	STABILISER STRUT	839		
RM450	3	STABILISER HORIZONTAL	559		
RM450	3	STABILISER MOUNT	1075		

TOTAL QTY = 12 COMPONENT SCHEDULE

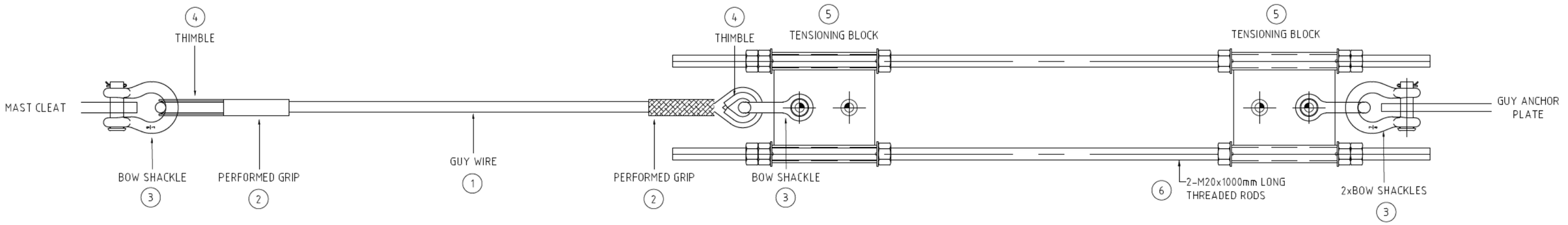
REFERENCE DRAWINGS	REF	REVISION	BY	DATE
..	B	ISSUED FOR CONSTRUCTION	C.J.C	16-12-20
...	A	ISSUED FOR REVIEW	D.T	16-12-20

ROAM PTY LTD
8 Meka Street
Malaga W.A. 6090 Australia
Tel (618) 9248 4950 Fax (618) 9248 4951

ERECTION DRAWING

DESCRIPTION: TORSIONAL STABILISER

REF:	APPR: C.J.C	DATE: 16-12-20	TOWER TYPE: RM450	MODULE:
SCALE: (A3) NTS	DRAWN: D.T	DATE: 16-12-20	DRG.No. RJ12748-2-TS1	REV B



	QUANTITIES PER ASSEMBLY REQUIRED																	
	①				②		③		④		⑤		⑥					
GUY-WIRE LEVEL	GUY WIRE				PREFORMED GRIP		BOW SHACKLE (bow size)		THIMBLE		TENSIONING BLOCK		THREADED RODS		INITIAL	TOTAL No. OF
	GRADE	CONSTRUCTION	GUY LENGTH	SUPPLIED LENGTH	ø (GRADE)	QTY	GRADE 'S' (WLL)	QTY	SIZE	QTY	TYPE	QTY	SIZE	QTY	TENSION (kN)	ASSEMBLIES
2	1320	7/2.75 (ø8.25)	35m	40m	8.25 (1320)	2	13mm (2.0t WLL)	4	10mm	2	TB8	2	M20x1000mm	2	5.2	3
1	1320	7/2.00 (ø6.00)	25m	30m	6.00 (1320)	2	13mm (2.0t WLL)	4	10mm	2	TB8	2	M20x1000mm	2	2.7	6

NOTES:

1. Guy lengths in table are based upon a flat level site. Adjust cut guy lengths to compensate for any on-site anchor radius adjustments.
2. All shackles pins to be wired to body on assembly.
3. Check and adjust all guy wires to match initial tensions in table. Tension values based on still wind conditions

SIZE	QTY	DESCRIPTION	GRADE/FINISH	SUPPLIED BY
HARDWARE SCHEDULE				
M20x1000mm	18	M20 THREADED ROD	GRADE 8.8 GALV.	ROAM
M20 NUT	108	M20 NUT	CLASS 8 GALV.	ROAM
M20 WASHER	72	M20 FLAT WASHER	GRADE 8.8 GALV	ROAM
10mm THIMBLE	18	10mm THIMBLE	GALV.	ROAM
13mm SHACKLE	36	13mm (2.0t WLL) BOW SHACKLE	GRADE S - GALV.	ROAM
6.00 GRIP	12	PREFORMED GRIP SUIT ø6.00 WIRE	GALV.	ROAM
8.25 GRIP	6	PREFORMED GRIP SUIT ø8.25 WIRE	GALV.	ROAM
7/2.00 (ø6.00)	180m	GUY WIRE	GRADE 1320 - GALV.	ROAM
7/2.75 (ø8.25)	120m	GUY WIRE	GRADE 1320 - GALV.	ROAM

DRG	COMPONENT	QTY	DESCRIPTION	LENGTH	MATERIAL	GRADE
RA07	TB8 revB	18	GUY-TENSIONING BLOCK	158		
TOTAL QTY = 18			COMPONENT SCHEDULE			

REFERENCE DRAWINGS	REF	REVISION	BY	DATE
. .	C	TURNBUCKLES REPLACED WITH TENSIONING BLOCKS	C.J.C	22-01-21
	B	ISSUED FOR CONSTRUCTION	C.J.C	16-12-20
	A	ISSUED FOR REVIEW	D.T	15-12-20

ROAM PTY LTD
8 Meka Street
Malaga W.A. 6090 Australia
Tel (618) 9248 4950 Fax (618) 9248 4951

ERECTION DRAWING

DESCRIPTION: GUY WIRE ASSEMBLY

REF:	APPR:	DATE:	TOWER TYPE:	MODULE:
-	C.J.C	16-12-20	-	-

SCALE: (A3)	DRAWN:	DATE:	DRG.No.	VER	REV
NTS	D.T	15-12-20	RJ12748-2-GW1	-	C

MAST ERECTION METHOD OF PROCEDURE

IMPORTANT:

Roam structures are only to be erected by experienced qualified rigging personnel working in accordance with a safety plan that has been prepared in conjunction with a competent erection supervisor. The safety plan is expected to include a comprehensive job hazard analysis covering an assessment of lifts by cranes, winches ginpoles and juries, safe lifting of partly assembled modules and temporary lifting points. The Safety Plan for construction works should incorporate design hazards, design control measures and notes to the Constructor identified in the Safety in Design drawing.

MAST ERECTION PROCESS

1. Check shipping lists to ensure all materials have been delivered. Check materials for any damage. Any small areas of damaged galvanising should be repaired with zinc rich paint. Touch-up any paint damage.
2. When erecting the mast, the intention should be to have each mast span (guy level to guy level) fully assembled with all ancillaries (ladders, cable brackets, antenna mounts, torsional stabiliser, fall-arrest) installed, and guys attached, before mobilising a crane to site for lifting. Guy tensioning equipment and theodolites should also be set-up in advance.
3. Assemble mast sections, on the ground, into the spans that comprise the mast. The mast shall not be lifted in a single 30m span. Ensure that bolts are fully tightened before lifting the mast.
4. Mast sections typically have a top and bottom. Ensure sections are orientated to achieve a continuous bracing pattern and equal cable bracket spacing.
5. Refer to the guy-wire assembly drawing. The drawing specifies the expected final guy lengths based upon the surveyed positions on the mast foundations. The "supplied length" specified on the drawing typically allows for extra 3m for each individual guy. The guys for each mast should be cut to the "supplied length" dimension and attached to the guy lugs at the top of each corresponding mast span.
6. Set-up 2 x theodolites at approximate 90° apart and at a distance that enables the theodo ites to view the bottom of the mast and the top of the mast when fully erected.
7. Lift the bottom mast section into position, ensuring that the cable ladder and climbing ladder faces are orientated to best suit the site layout. Whilst the mast span is supported by the crane, pull the guys to the anchors, using turfers as required, and connect to the lowest anchor plate hole. Note that there is typically a spare hole at the top of the anchor plates for temporally attaching turfers and tensioning equipment.
8. Tension the lower set of guys until they are taut and support the mast without the aid of the crane. At this point the mast can be safely climbed with appropriate climbing gear to detach the crane hook.
9. Align the vertical crosshairs of the theodolites with one of the mast legs at the lowest point possible. Adjust guy tensions to align the bottom mast section until it is vertical within the precision of the theodolite. Achieve verticallity of 1:200 or better.
10. Repeat the process for the remaining mast spans.
11. Once the entire mast has been erected, attach and tension the fall-arrest cable, to the bottom tensioning bracket. The crane hook can be detached once all guys have been nominally tensioned maintaining mast verticality.

GUY TENSIONING PROCEDURE

1. Refer to the guy-wire assembly drawing. The values of initial tension have been calculated to achieve a vertical mast for the surveyed anchor positions. Initial tensions shall be achieved to within 10% of the specified value whilst maintaining mast verticality. Guy tension values are based upon still wind conditions.
2. Tensioning guys can be done with a guy-tension measuring instrument (such as a Piab RMT 20D) or with a load-cells. In either case, calibration records shall be maintained.

   Guys can be tensioned one-at-a-time but they would need to be checked and adjusted twice to correct for the impact of tensioning upon previously tensioned guys.

TENSIONING GUYS USING IN-LINE GAUGE

1. Connect load-cell to either side of the guy-tension-device (turnbuckle)
2. Tension the load-cell until the specified initial tension value is reached (+/- 10%)
3. Tension the guy-tension-device until the load-cell reading just reduces back to zero.
4. Release and remove the load-cell without adjusting the guy-tension-device.

BEFORE DEMOBILISING FROM SITE

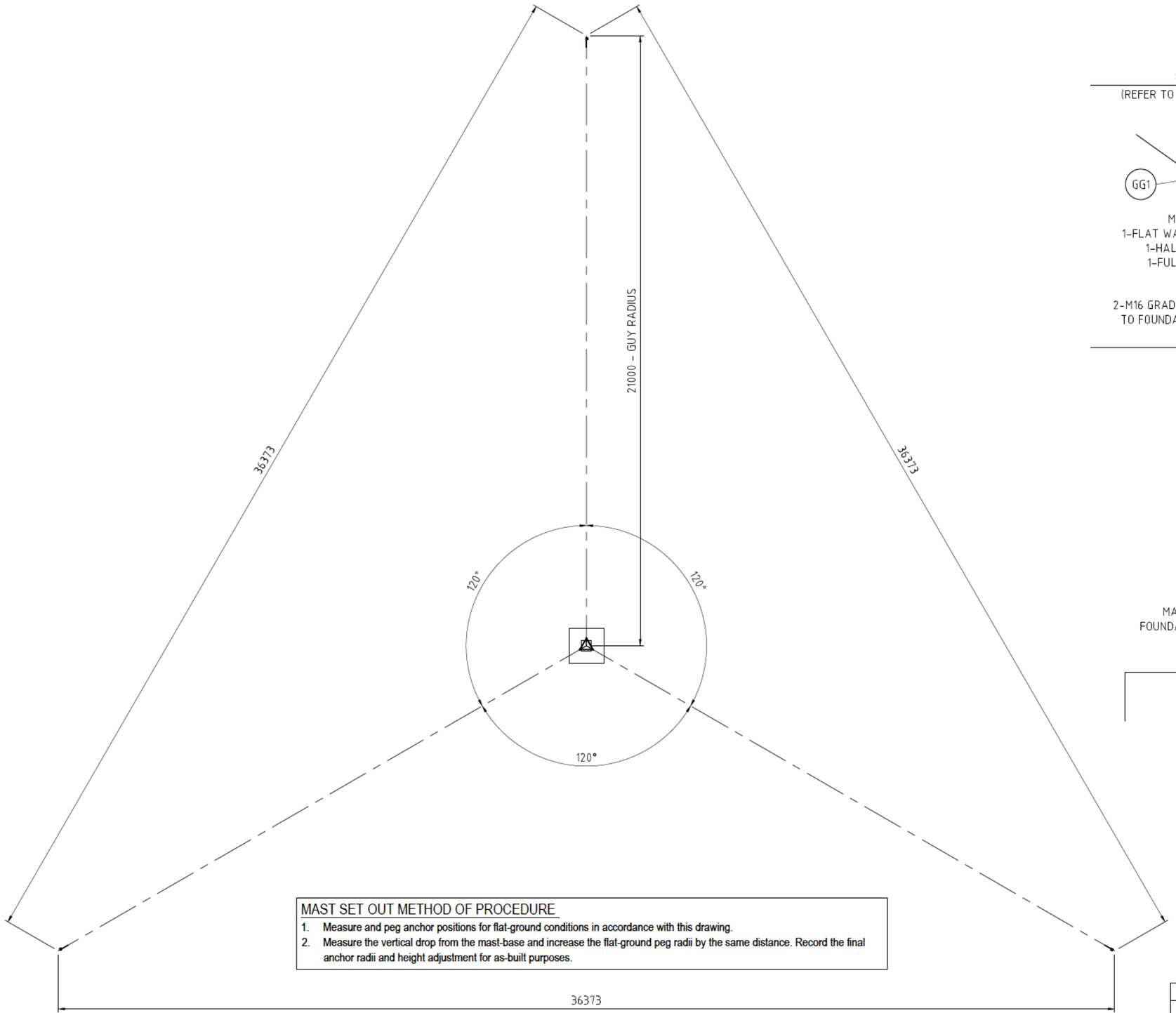
1. Once guys have been tensioned, re-tension the fall arrest cable and check that all mast splice bolts are properly tightened and have not loosened during the erection process.
2. Complete the mast inspection form supplied with the mast drawings.
3. On completion of all works, mark up the erection drawings and material lists;
   - i. Sign off drawings as as-built and records on the drawings any changes
   - ii. Fabrication mistakes
   - iii. Drawing mistakes
   - iv. Problems encountered during erection
   - v. Suggested design improvements
   - vi. Under-supply or over-supply of materials
   - vii. Appearance of structure.
4. Take photographs including one shot showing the entire structure.
5. Scan all drawings, lists and checklists and email these documents along with photographs and any other documentation to roam@roameng.com.au

REFERENCE DRAWINGS		REF	REVISION	BY	DATE
-	-	B	ISSUED FOR CONSTRUCTION	C.J.C	16-12-20
		A	ISSUED FOR REVIEW	D.T	15-12-20

ROAM PTY LTD
437 VICTORIA ROAD
MALAGA W.A. 6090 AUSTRALIA
TEL (618) 9248 4950 FAX (618) 9248 4951

DESIGN: C.J.C	DATE: 15-12-20	ROAM PTY LTD STANDARD GUYED-MAST ERECTION NOTES (SHEET 1 OF 1)
APPR: C.J.C	DATE: 16-12-20	
DRAWN: D.T	DATE: 15-12-20	SCALE: (A3) N.T.S / DWG. No. RJ12748-2-GM1 / VER. 07 / REV. B

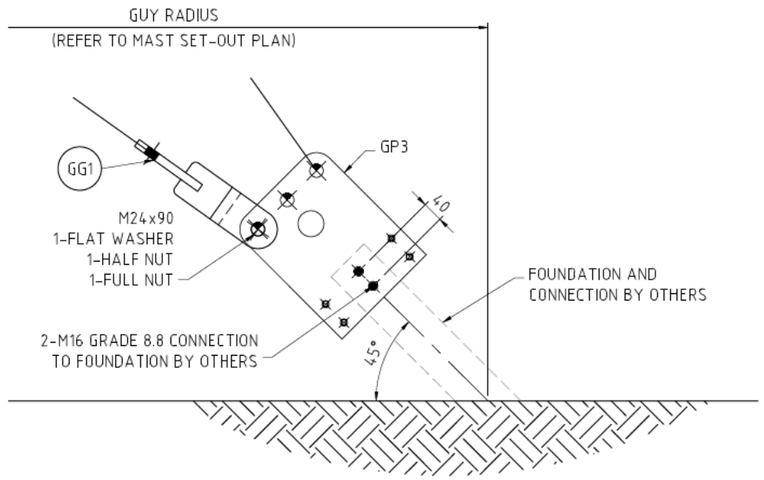
HARDWARE SCHEDULE				
SIZE	QTY	DESCRIPTION	GRADE/FINISH	SUPPLIED BY
M24x90	3	HEX. HD. BOLT c/w NUT & FLAT WASHER	GRADE 8.8 GALV	ROAM
M24	3	HALF NUT (LOCK NUT)	GRADE 8.8 GALV	ROAM



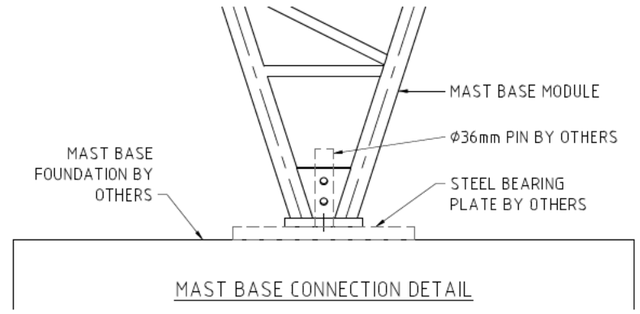
MAST SET OUT METHOD OF PROCEDURE

1. Measure and peg anchor positions for flat-ground conditions in accordance with this drawing.
2. Measure the vertical drop from the mast-base and increase the flat-ground peg radii by the same distance. Record the final anchor radii and height adjustment for as-built purposes.

FLAT GROUND MAST SET-UP PLAN



GUY ANCHOR PLATE DETAIL



MAST BASE CONNECTION DETAIL

RM01	GG1	3	SPLITTER PLATE	325		
RM01	GP3	3	ANCHOR PLATE	300		
DRG	COMPONENT	QTY	DESCRIPTION	LENGTH	MATERIAL	GRADE

TOTAL QTY = 6 COMPONENT SCHEDULE

	B	ISSUED FOR CONSTRUCTION	C.J.C	16-12-20
	A	ISSUED FOR REVIEW	D.T	15-12-20
REFERENCE DRAWINGS	REF	REVISION	BY	DATE

ROAM PTY LTD
8 MEKA STREET
MALAGA W.A. 6090 AUSTRALIA
TEL (618) 9248 4950 FAX (618) 9248 4951

DESIGN: C.J.C	DATE: 15-12-20	CRISP WIRELESS	
APPR: C.J.C	DATE: 16-12-20	30m RM450 GUYED MAST - TOWER D NN	
DRAWN: D.T	DATE: 15-12-20	MAST SET-OUT	
SCALE: (A3) N.T.S	DWG. No. RJ12748-3-1	VER. -	REV. B

Hazard assessment table				
	1	2	3	4
A	E	H	S	M
B	E	H	S	M
C	H	S	M	L
D	S	M	L	L

Risk Rank	Probability	Consequence
E - EXTREME	A –Likely "common or repeating occurrence"	1 – fatality or permanent disability
H - HIGH	B – Occasionally "happens every now and then"	2 – lost time injury or serious illness
S - SUBSTANTIAL	C – Unlikely "has been known to happen"	3 – medical treatment
M - MODERATE	D – Very Unlikely "possible but probably never will"	4 – possible first-aid treatment
L - LOW		

		Design Hazard	Probability	Consequence	Risk Rank	Design Control Measures	Controlled Probability	Controlled Consequence	Controlled Risk Rank	Note to the Constructor The purpose of this document is to summarise the hazards and control measures identified for the design phase of the project. This document does not specifically consider construction risks and hazards and is not a substitute for a construction work safety risk assessment.	Site Supervisor Sign
SAFE CONSTRUCTION	1	Hazards associated with inadequate documentation	D	2	M	Drawings checked and approved as for-construction status in accordance with Roam QMS procedures. Construction and erection guidance notes issued with the drawing pack. Construction notes presented on the drawing.	D	4	L	Ensure all construction notes are read and understood prior to commencing any works	
	2	Injury due to manual handling of excessive weight	D	3	L	Material listings provided to enable assessment of component weights	D	4	L	Implement control measures to limit manual handling. Consider installing feeder cables and antennas at ground level before lifting structure sections.	
	3	Dropping steelwork onto personnel during crane lift	D	1	S	Erection guidance notes are provided in the site document pack.	D	4	L	Roam site documentation will include list of component weights that can be used to calculate the weight of planned lifts. Refer to erection guidance notes. Dwg RJ12748-2-GM1	
	4	Fall or injury when erecting structure with a crane	D	1	S	Ladders are designed to be integral with structure lifts.	D	4	L	Method of procedure should be reviewed by suitably competent person. Refer to structure erection guidance notes. Dwg RJ12748-2-GM1	
	5	Fall or injury when erecting structure using manual erection	C	1	H	Suitably sized cranes are readily available to use rather than manual erection methods.	D	4	L	Method of procedure should be reviewed by suitably competent person. Refer to structure erection guidance notes. Dwg RJ12748-2-GM1	
	6	Structure collapse due to design fault	C	1	H	Proper compliance with QMS design and document control procedures	D	4	L	Only use current for-construction drawings	
SAFE USE & MAINTENANCE	7	Hazards associated with inadequate documentation	D	1	S	Fall-arrest supplier documentation supplied with structure.	D	4	L	Fall-arrest documentation to be handed over to tower owner.	
	8	Fall or injury when accessing antenna mounting positions	D	1	S	Structure is 450mm wide so all antennas are easily accessible.	D	4	L	Antenna mount design is by others. Residual risk to be controlled by appropriate JHA's.	
	9	Fall or injury when accessing feeder cables	D	1	S	Feeder cables located on cable brackets on face of the tower and can be accessed from climbing face.	D	4	L		
	10	Fall or injury when climbing structure	D	1	S	Compliant ladder with fall-arrest device provided.	D	4	L	Note that climbing harness and cable sleeve not supplied with fall-arrest device. Climbing past the torsional stabiliser will require a double lanyard & temporary detachment from the fall-arrest system.	
	11	Fall or injury when repairing surface coatings	D	1	S	Structure to be galvanized in accordance with Ausrtalian Standards to prevent premature degradation and the need to undertake premature repair works and maintenance.	D	4	L		

REFERENCE DRAWINGS		REF	REVISION	BY	DATE
-	-	B A	ISSUED FOR CONSTRUCTION ISSUED FOR REVIEW	C.J.C D.T	16-12-20 15-12-20

ROAM PTY LTD
437 VICTORIA ROAD
MALAGA W.A. 6090 AUSTRALIA
TEL (618) 9248 4950 FAX (618) 9248 4951

DESIGN: C.J.C	DATE: 15-12-20	CRISP WIRELESS - TOWER D NN SAFETY IN DESIGN RISK ANALYSIS ANTENNA SUPPORT STRUCTURE	
APPR: C.J.C	DATE: 16-12-20		
DRAWN: D.T	DATE: 15-12-20	SCALE: (A3) N.T.S	DWG. No. RJ12748-4-SD1

VER.	REV.
3	B

Attachment 6: General Antenna Information

ePMP™ 3000 Sector Antenna

Cambium Networks has deployed more than five million radios around the world achieving unparalleled degrees of scalability. Continuing the tradition of designing and manufacturing industry leading antenna solutions, the ePMP 3000 4X4 sector antenna encompasses all the key differentiations of the Cambium Antenna line and adds 4X4 Multi User MIMO Capability. Designed to work in 5 GHz spectrum and 90 degree coverage, the antenna is an integral part of the ePMP 3000 Access Point and allows for Multi User MIMO Operation.

KEY DEPLOYMENT ADVANTAGES

- **Frequency Re-use:** Designed for ABAB channel re-use (two channels covering four sectors), the sector antenna has a minimum 30 dB front to back ratio over a wide rear facing aperture.
- **Channel Flexibility:** Consistent gain from 4.9 to 6.0 GHz allows the operator to select a channel anywhere in the band and achieve the expected performance.
- **Consistent Coverage:** Excellent null fill capabilities of the antenna allow for broad geographical coverage within a sector even near the base of the tower and the edges of the sector.
- **Designed for the Installer:** Small, compact design, integrated ePMP radio mount and GPS antenna integration.
- **Predictable Performance:** The sector antenna is integrated into Cambium Networks LINKPlanner. The 3D model shows coverage at all elevations and across the azimuth.

KEY SPECIFICATIONS:

- 17 dBi gain
- 4.9 to 5.97 GHz spectrum
- 30 dBi front to back ratio
- IP 65 ruggedization

SPECIFICATIONS

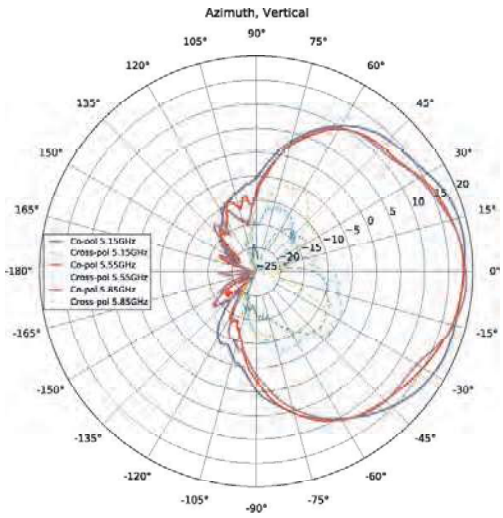
ePMP 3000 SECTOR ANTENNA	
Model Number	C050910D301A
Frequency Range	4.9 GHz to 5.97 GHz
Gain	17 dBi
3 dB Beamwidth - Azimuth	70 degrees
3 dB Beamwidth - Elevation	6 degrees
Electrical Downtilt	-2 degrees
Polarization	2X Horizontal, 2X Vertical

SPECIFICATIONS

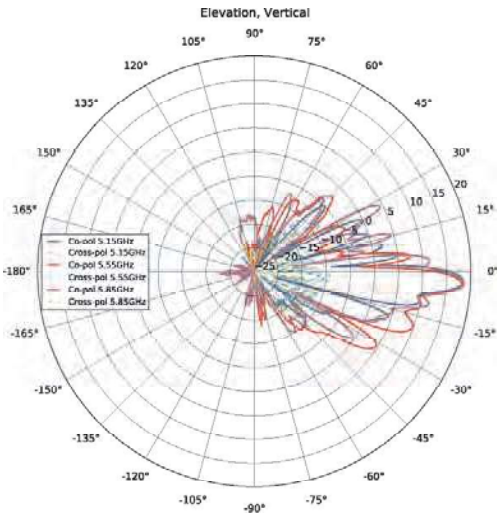
ePMP 3000 SECTOR ANTENNA	
Model Number	C050910D301A
Port-to-Port Isolation	> 20 dB
Front-to-Back Ratio	30 dB
Maximum Input Power	5 W
Input Impedance	50 ohms
Mounting Connectors	4 x RP SMA
Mounting Hardware	Included for mounting to mast diameters 2" to 4" (5 cm to 10 cm) -10 to +5 degree tilt Hardware included to connect ePMP access point to back of antenna body
Physical Dimensions	Antenna Body: 23.4" (H) x 9.6" (W) x 3.25" (D) (594 mm x 157 mm x 110 mm)
Weight	Antenna Body: 8.0 lbs, 3.7 kg w/ ePMP 3000 Access Point and Mounting Brackets: 13.8 lbs. 6.3 kg
Environmental	IP65
Radome Material	UV Protected ABS
Operating Temp	-40°C to 60°C (-40°F to 140°F)

ANTENNA PATTERNS

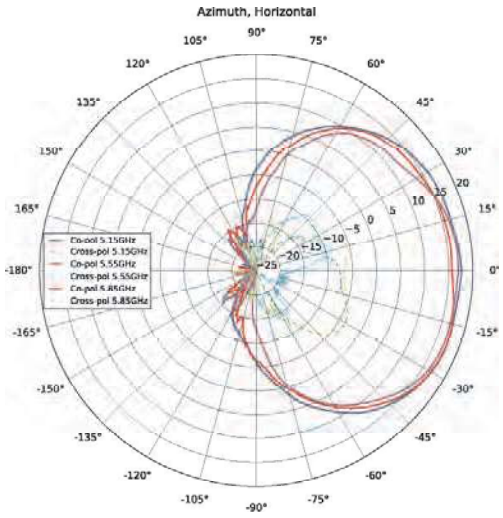
Channel 0 Vertical Polarization Azimuth



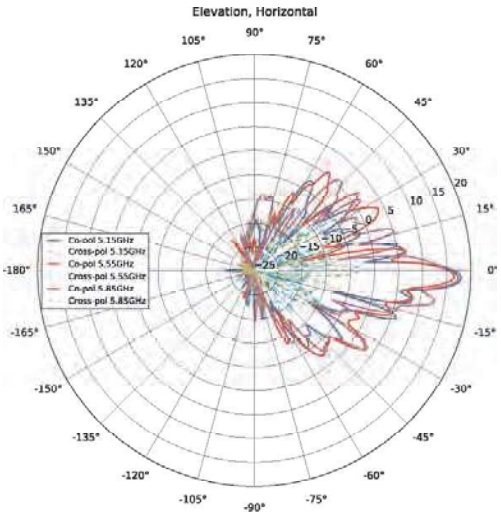
Channel 0 Vertical Polarization Elevation



Channel 1 Vertical Polarization Azimuth

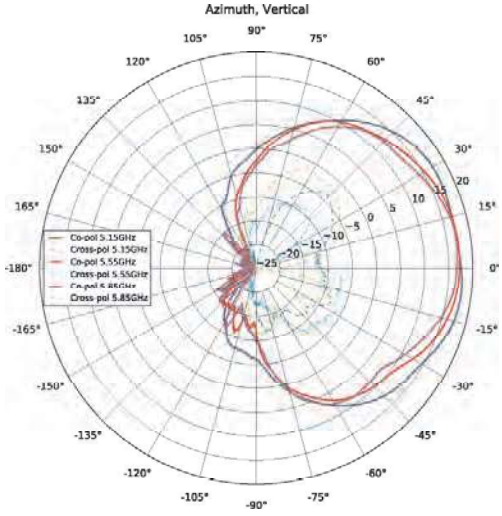


Channel 1 Vertical Polarization Elevation

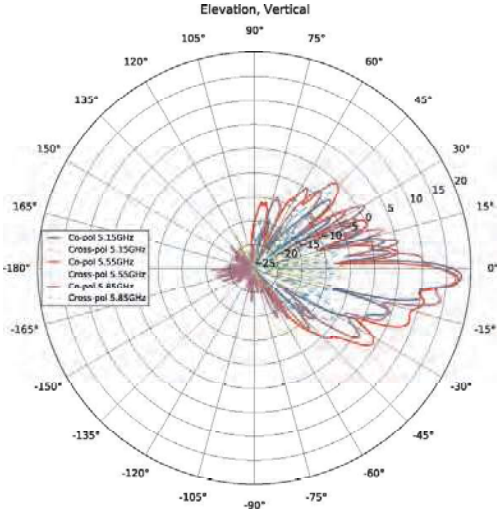


ANTENNA PATTERNS

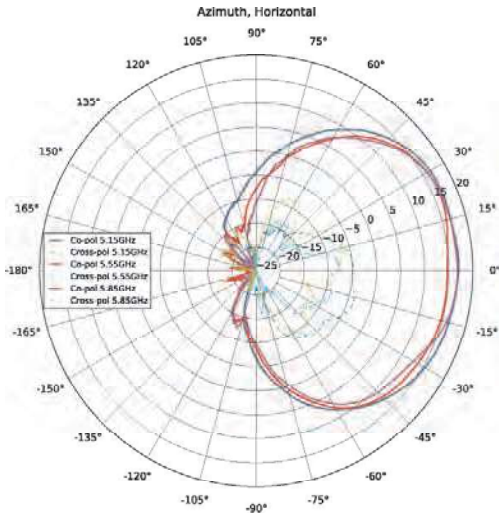
Channel 2 Vertical Polarization Azimuth



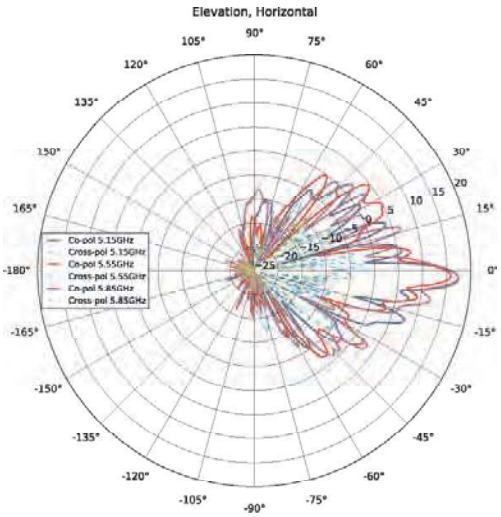
Channel 2 Vertical Polarization Elevation



Channel 3 Vertical Polarization Azimuth



Channel 3 Vertical Polarization Elevation



Cambium Networks™

5.25 - 5.85 GHz High Performance Dual Pole Parabolic Reflector Antenna

High Performance Dual Pole Parabolic Reflector Antennas from Cambium Networks are well-suited for deployment with any of the sub-6 GHz PTP products. They are engineered to provide ETSI class 2/3 radiation pattern performance as well as excellent gain. Field-proven preassembled antennas and robust pole mounts ensure "set and forget" installation with minimal post installation maintenance. The included radome ensures robust and reliable performance under the most challenging conditions.

FEATURES AND BENEFITS:

- High Performance ETSI Class 2/3* Parabolic Antennas – Excellent performance for a wide range of applications
- Fully Preassembled at the Factory – Simplifies installation on site and guarantees "factory tested" quality
- Industry leading 7year warranty
- Suitable for deployment with PTP 650, PTP 670, PTP 700 and PTP 450i connectorized radios.
- Fully supported in LINKPlanner™ providing accurate predictions of PTP link performance and availability. LINKPlanner™ is available at no charge from the support website at cambiumnetworks.com.

**ETSI Class depends on frequency band*

SPECIFICATIONS

GENERAL

Antenna Type	High Performance Parabolic Reflector Antenna
Size, nominal	2 ft (0.6 m); 3 ft (0.9 m); 4 ft (1.2 m)
Polarization	Dual
Standard RF Connector Type	N-Female

SPECIFICATIONS

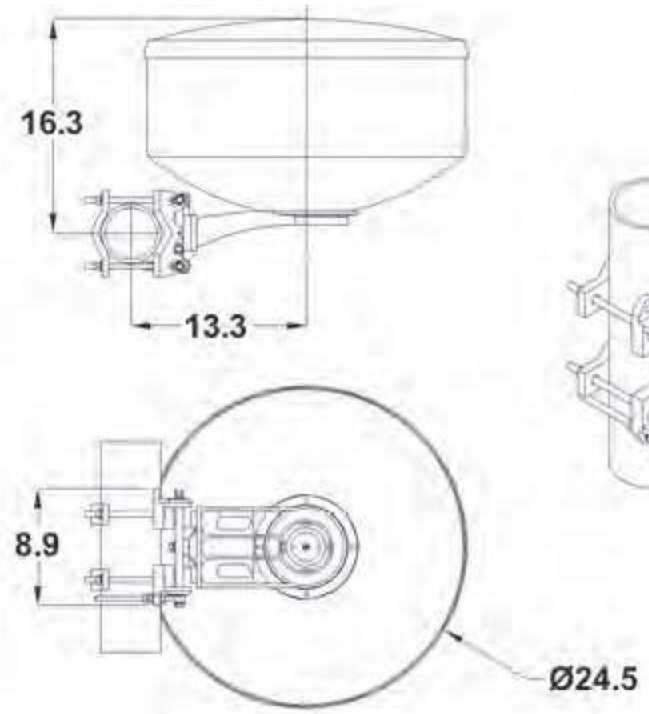
ELECTRICAL	2 FT (0.6 M)	3 FT (0.9 M)	4 FT (1.2 M)
Model Number	RDH4508B	RDH4509B	RDH4510B
Description	5.25-5.85 GHZ, 2-FT (0.6M), HIGH PERFORMANCE DUAL-POL	5.25-5.85 GHZ, 3-FT (0.9M), HIGH PERFORMANCE DUAL-POL	5.25-5.85 GHZ, 4-FT (1.2M), HIGH PERFORMANCE DUAL-POL
Operating Frequency Band	5.25 - 5.85 GHz	5.25 - 5.85 GHz	5.25 - 5.85 GHz
Half Power Beamwidth, Horizontal	6.1 degrees	4.2 degrees	3 degrees
Half Power Beamwidth, Vertical	6.1 degrees	4.2 degrees	3 degrees
Cross-Polarization Discrimination	28 dB	30 dB	30 dB
Front to Back Ratio (F/B)	44 dB	46 dB	49 dB
Gain, Low Frequency	28.3 dB	31.8 dB	34.2 dBi
Gain, Mid Frequency	28.8 dB	32.3 dBi	34.7 dBi
Gain, High Frequency	29.3 dB	32.8 dBi	34.7 dBi
VSWR	1.5:1	1.5:1	1.5:1
Return Loss	-14 dB	-14 dB	-14 dB

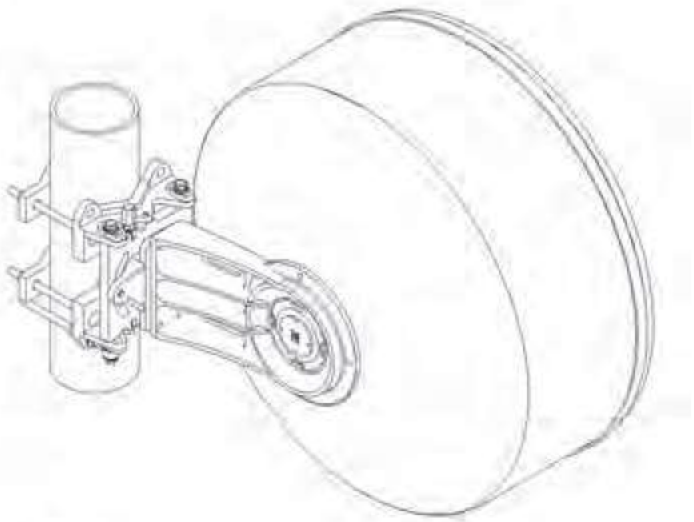
MECHANICAL	2 FT (0.6 M)	3 FT (0.9 M)	4 FT (1.2 M)
Model Number	RDH4508B	RDH4509B	RDH4510B
Description	5.25-5.85 GHZ, 2-FT (0.6M), HIGH PERFORMANCE DUAL-POL	5.25-5.85 GHZ, 3-FT (0.9M), HIGH PERFORMANCE DUAL-POL	5 .25-5.85 GHZ, 4-FT (1.2M), HIGH PERFORMANCE DUAL-POL
Fine Azimuth Adjustment	+/- 10 degrees	+/- 10 degrees	+/- 10 degrees
Fine Elevation Adjustment	+/- 30 degrees	+/- 25 degrees	+/- 25 degrees
Mounting Pipe Diameter, Min	2 inch | 5.08 cm	4.5 inch | 11.4 cm	4.5 inch | 11.4 cm
Mounting Pipe Diameter, Max	4.5 inch | 11.4 cm	4.5 inch | 11.4 cm	4.5 inch | 11.4 cm
Net Weight	27 lbs | 12.3 kg	50 lbs | 12.3 kg	85 lbs | 38.3 kg
Wind Velocity Operational	90 mph | 145 km/h	90 mph | 145 km/h	90 mph | 145 km/h
Wind Velocity Survival Rating	125 mph | 201 km/h	125 mph | 201 km/h	125 mph | 201 km/h
Axial Force (FA)	202 lbs | 899 N	403 lbs | 1972 N	737 lbs | 3278 N
Side Force (FS)	100 lbs | 445 N	200 lbs | 890 N	365 lbs | 1623 N
Twisting Moment (MT)	194 ft-lbs | 263 Nm	344 ft-lbs | 466 Nm	784 ft-lbs | 1063 Nm
Operating Temperature Range	-40 to +60 C	-40 to +60 C	-40 to +60 C
Max Pressure, PSIG, (if waveguide interface)	5	5	5

REGULATORY COMPLIANCE			
RoHS-compliant	Yes	Yes	Yes

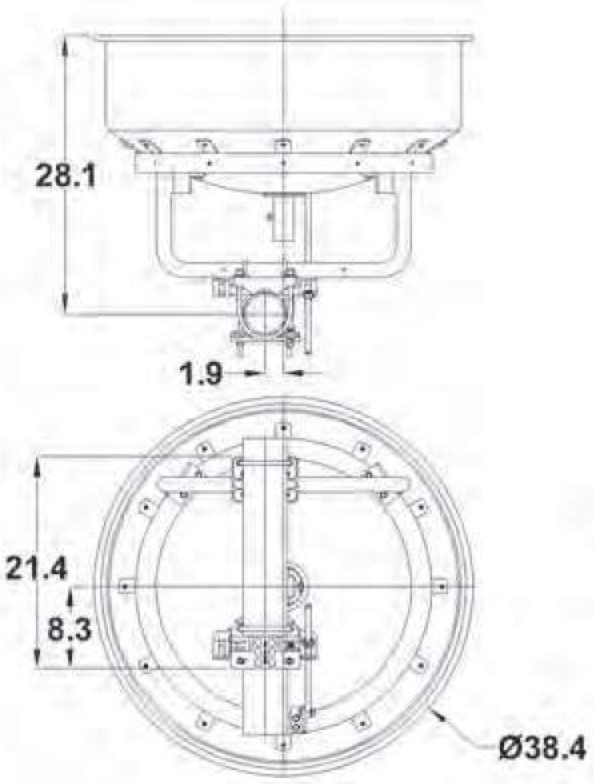
SHIPPING INFORMATION	2 FT (0.6 M)	3 FT (0.9 M)	4 FT (1.2 M)
Model Number	RDH4508B	RDH4509B	RDH4510B
Description	5.25-5.85 GHZ, 2-FT (0.6M), HIGH PERFORMANCE DUAL-POL	5.25-5.85 GHZ, 3-FT (0.9M), HIGH PERFORMANCE DUAL-POL	5.25-5.85 GHZ, 4-FT (1.2M), HIGH PERFORMANCE DUAL-POL
Package Type	Cardboard	Wood Crate	Wood Crate
Gross Weight	48 lbs | 28.7 kg	143 lbs | 69.8 kg	196 lbs | 88.9 kg
Dimensions, L x W x H	31 x 31 x 25in | 79 x 79 x 64 cm	47 x 28 x 48in | 119 x 71 x 122 cm	59 x 35 x 60in | 180 x 89 x 152 cm
Shipping Volume	13.9 cu ft | 0.39 cu m	36.56 cu ft | 1.04 cu m	71.7 cu ft | 2.03 cu m

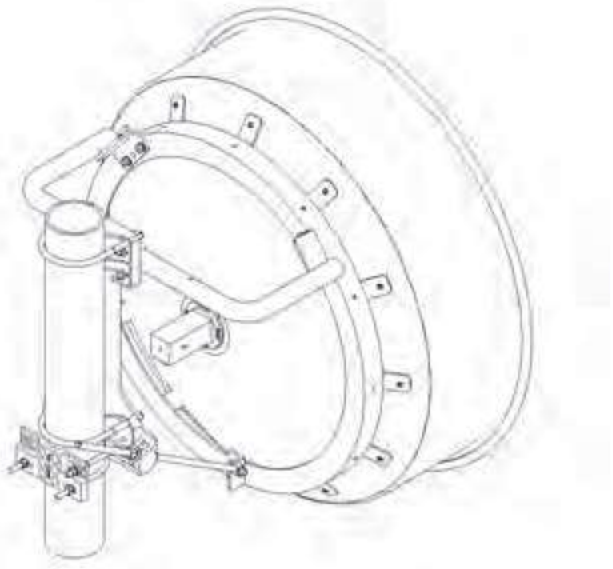
TECHNICAL DRAWINGS





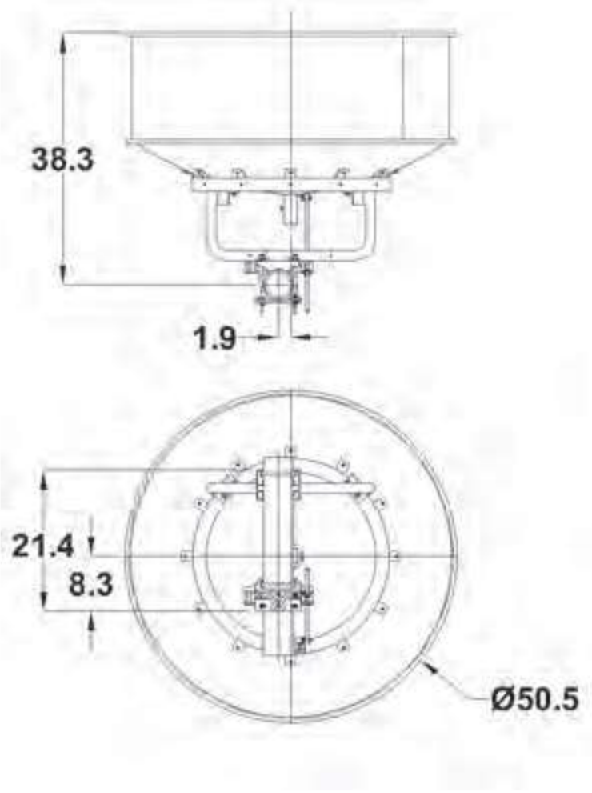
RDH4508B 5.25-5.85 GHZ, 2-FT (0.6M), HIGH PERFORMANCE DUAL-POL

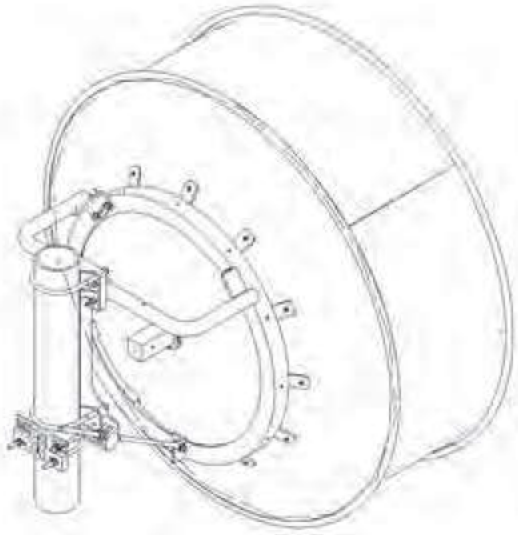




RDH4509B 5.25-5.85 GHZ, 3-FT (0.9M), HIGH PERFORMANCE DUAL-POL

TECHNICAL DRAWINGS





RDH4510B 5.25-5.85 GHZ, 4-FT (1.2M), HIGH PERFORMANCE DUAL-POL

TECHNICAL SPECIFICATIONS

	PTP 820S	PTP 820C + PTP 820C HP	PTP 820G	PTP 820F	PTP 820E	PTP 850E
Supported Frequency	6–38 GHz	6 – 38 GHz	6 – 38 GHz	6–38, 71–76, 81–86 GHz	71–76, 81–86 GHz	71–76, 81–86 GHz
Role in the Network	Compact all outdoor	Compact all outdoor w/ multi-core	Split Mount or all Indoor, multi-carrier options	Split mount or all-indoor, multi-carrier options	Multiband with PTP 820C/S	Multiband with PTP 820C/S
Transport Technology	All packet	All packet	Hybrid and/or all packet	Hybrid and/or all packet	All packet	All packet
TDM Interface	None	None	16 x E1/T1	16 x E1/T1	None	None
Modulation	QPSK to 2048 QAM w/ACM	QPSK to 2048 QAM w/ACM	QPSK to 2048 QAM w/ACM	QPSK to 4096 QAM w/ACM	BPSK to 1024 QAM w/ACM	BPSK to 512 QAM w/ACM
Channel Size	3.5 to 80 MHz	3.5 to 80 MHz	3.5 to 60 MHz	6–38 GHz 14 to 112 MHz, 71–86 GHz : 62.5 to 500 MHz	62.5 – 500 MHz	250 MHz to 2 GHz
Capacity (Layer 2)	679 Mbps	1.36 Gbps	527 Mbps, 1.05 Gbps	542 Mbps, 1.08 Gbps	2.4 Gbps	10 Gbps
Capacity with Multi-Layer Compression	833 Mbps	1.67 Gbps	833 Mbps (1+0) 1.67 Gbps (2+0)	1.69 Gbps (1+0) 3.2 Gbps (2+0)	2.4 Gbps (1+0) 4.8 Gbps (2+0)	10 Gbps (1+0) 20 Gbps (2+0)
Configuration	1+0, 1+1 HSB, 2+0	1+0 to 4+0, 1+1/2+2 HSB, E/W, 1+0 SD, 2+2 SD	1+0, 1+1 HSB, 2+0 (E/W), 2+0 XPIC, 2+0 MC-ABC	1+0, 3 x 1+0, 2 x 2+0, 2 x 2+0 + 1+0, 1+1 HSB*, 2+2 HSB*	1+0, 2+0	1+0, 2+0 (XPIC)
LOS MIMO	No	Yes, 4x4 or 2x2	No	No	No	No
XPIC	No	Yes	Yes	Yes	No	Yes
Ethernet Interface	1 x 10/100/1000Base-T and 2x1000base-X or 10/100/1000Base-T	1 x 10/100/1000Base-T and 1x1000base-X or 10/100/1000Base-T	4 x 10/100/1000Base-T and 2x1000base-X	4x1 Gbe (RJ-45/SFP) 1x 2.5/1 Gbps SFP	1x 10/100/100Base-T, PoE 1x 1Gbps SFP cage Optional: 1 x10/100/100 Base-T or 10 Gbps SFP cage	1x 2.5/1 Gbps SFP 1x 10 Gbps SFP 10 GE (SFP+) Optional QSFP(4x1/10 GE or 1x40) or SFP+ (1x10 GE)
Management Interface	1 x 10/100 Base-T	1 x 10/100 Base-T	1 x 10/100 Base-T	1 x 10/100 Base-T	1 x10/100/100 Base-T for management	1 x 1 GE RJ-45 for management
External Alarm	None	None	1 x DB9	1 x DB9	None	None
Dimensions (HxWxD – mm)	230 x 233 x 98	PTP 820C: 230x233x98 PTP 820C HP: 315x284x107	IDU: 44x426x180 RFU-C: 200x200x85 RFU-A: 44x443x421	IDU: 44x482x165 RFU-D: 230x233x98 RFU-D-HP: 319x286x107 RFU-S: 277x210x85 RFU-E: 220x198x75	220x198x75 43 dBi integrated antenna: 280x280x110	322x227x86 43 dBi ingegrated antenna: 341x270x103
Environmental	-33°C to +55°C (-45°C to +60°C extended)	-33°C to +55°C (-45°C to +60°C extended)	IDU: -5°C to +55°C (-25°C to +65°C extended) RFU-C: -33°C to +55°C (-45°C to +60°C extended) RFU-A: -5°C to +55°C (-25°C to +65°C extended)	IDU: -5°C to -55°C (-45°C to +60°C extended); RFU: -33°C to +55°C (-45°C to +60°C extended)	-33°C to +55°C (-45°C to +60°C extended)	-33°C to +55°C (-45°C to +60°C extended)
Power Input	-48 VDC	-48 VDC	-48 VDC	-48 VDC	-48 VDC	-48 VDC
PoE Injector Power Input	-48 VDC or +24 VDC	PTP 820C ONLY: -48VDC or +24VDC	N/A	N/A	-48 VDC or +24 VDC	-48 VDC or +24 VDC
Maximum Power Consumption	6–11 GHz: 40W; 13–38 GHz: 35W	Multi-Core Operation: PTP 820C: 6 GHz: 65W; 7 GHz: 75W; 11 GHz: 65W; 13–15 GHz: 55W; 18–24 GHz:48W; 26–38 GHz: 55W PTP 820C HP: 135W	IDU Eth-only with single modem: 23.5W, addition for second modem, 2.9W, additional for 16 E1/DS1: 11W • RFU-C: 6–26 GHz; 1+0 22W; 1+1 39W; 28–38 GHz, 1+0 26W; 1+1 43W RFU-Ae / RFU-Aep • 1+0 High Level: 77W / 90W Medium Level: 53W / 73W Low Level: 43W / 47W Mute: 24W / 24W • 1+1 HSB/SD BBS: High Level: 101W / 114W Medium Level: 77W / 97W Low Level: 67W / 71W Mute: 48W / 48W	IDU: 48W maximum RFU-D: 75W RFU-D-HP: 130W/180W RFU-S: 43W RFU-E: 43W	43W Active 35W Standby	58W Active 47W Standby

US Headquarters

3800 Golf Road, Suite 360.
Rolling Meadows, IL. 60008 USA
+1 888 863 5250

San Jose Office

2010 N. 1st Street, Suite 400
San Jose, CA 95131 USA

Thousand Oaks Office

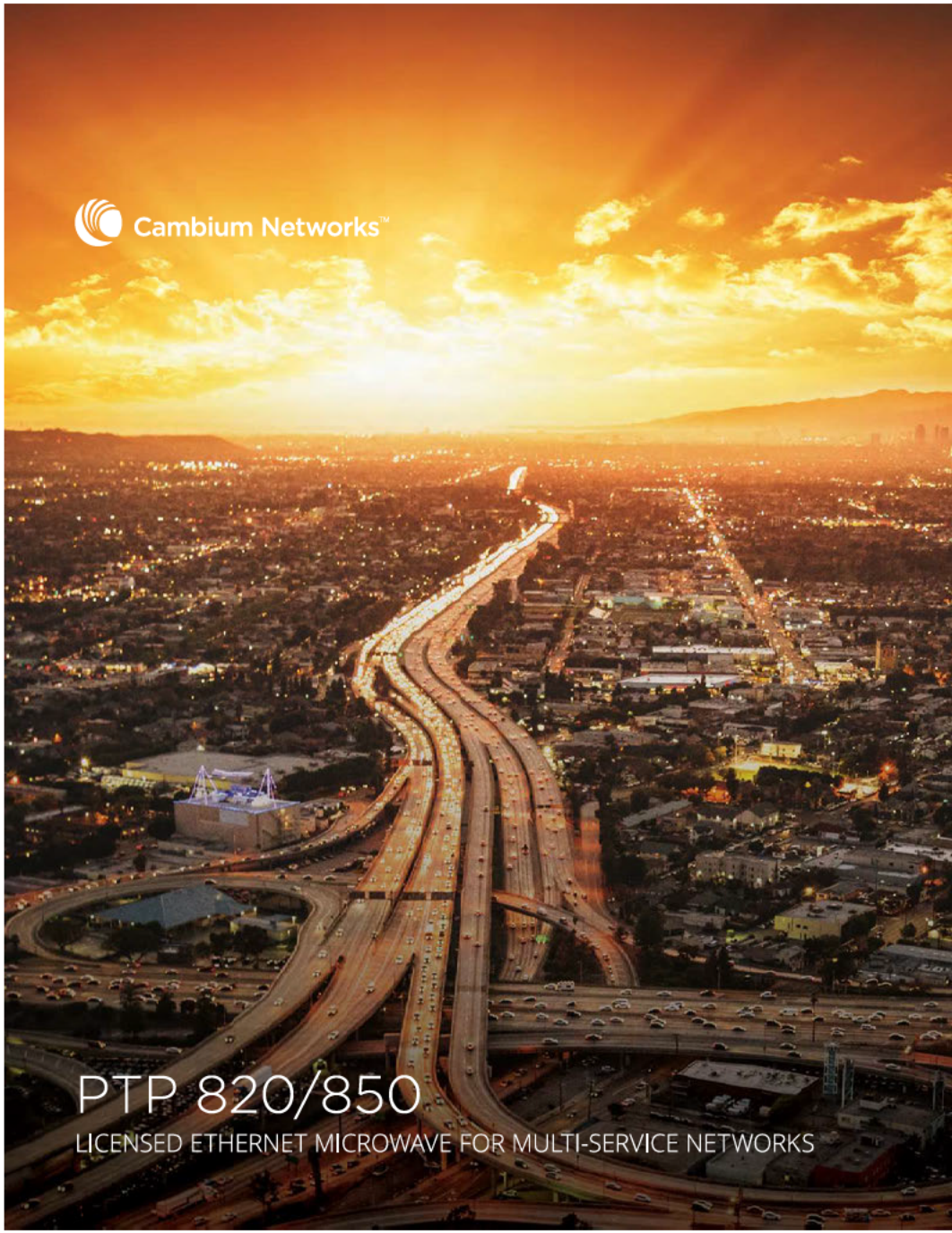
2101 Corporate Center Dr # A
Newbury Park, CA 91320 USA

India Office

Cambium Networks Consulting Private Ltd
5th Floor, Quadrant 1, Umiya Business Bay, Tower 2,
Outer Ring Road,
Kadubisenahalli, Varthur Hobli Road, Bangalore East
Taluk, Bangalore- 560037
+91 80 67333100

UK Office

Unit B2, Linhay Business Park,
Eastern Road, Ashburton, United Kingdom, TQ13 7UP
+44 1364 655500



Cambium **PTP** 820/850


PTP 820S


PTP 820C


PTP 820E


PTP 850E


PTP 820G
Split-Mount / All-Indoor, Multi-Carrier


PTP 820F
Split-Mount / All-Indoor, Multi-Carrier

A single platform serving all radio transport requirements.


PUBLIC SAFETY


ENTERPRISE


WIRELESS CARRIER


WIRELESS INTERNET SERVICE PROVIDER

PTP 820/850 is a point-to-point licensed microwave backhaul platform that integrates leading networking functionality with the industry's most advanced microwave technologies, creating a superior microwave transport solution.

Supporting licensed frequency bands ranging from 6 to 86 GHz, the PTP 820/850 series delivers a wide range of configurations to offer a tailored solution for any deployment scenario.

Composed of high-density multi-technology nodes and integrated radio units, the PTP 820/850 series offers flexibility in choosing all-indoor, split-mount, and all-outdoor configuration options. Exploiting unique Line of Sight (LOS) Multiple Input Multiple Output (MIMO) technology, modulation up to 4096 QAM and wider channel bandwidths ensures industry-leading throughput and spectral efficiency.

The PTP 820E/850E operate in E-Band radio providing throughput up to 20Gbps, this eliminates the need for future forklift upgrades, or major system overhaul by the network operator to deliver multi gigabit-plus capacity.

PTP 820/850 also offers both Synchronous Ethernet (SyncE) and IEEEv2 synchronization protocols required for large ISP and MPLS networks.

Operations, Administration and Maintenance (OA&M) tools coupled with a full suite of network and element management systems (NMS and EMS) simplify network provisioning and monitoring, reducing operators' total cost of ownership and enabling them to meet the most stringent service level agreements.

Combining technologies, equipment and services, PTP 820/850 enables network operators to meet accelerating demand for capacity cost-effectively under rapidly evolving conditions.

PTP 820/850 Product Series Highlights

- Licensed frequency bands 6-86 GHz
- Up to 4096 QAM, with 12-step hitless and errorless Adaptive Coding & Modulation (ACM) for high reliability
- Up to 20 Gbps bandwidth supported
- Multi-gigabit radio capacity with high spectral efficiency
- TDM and/or packet supporting legacy services and evolution to all-packet
- Integrated Ethernet Switch, MEF Carrier Ethernet 2.0 compliant, MPLS-TP-ready
- Header de-duplication for additional capacity boost
- Intelligent service-centric management utilizing QoS and advanced OA&M capabilities
- Carrier-grade service resiliency (G.8032, MSTP)
- ITU-T Y.1731 Performance Management – MEF 35
- Integrated synchronization solution: Native/SyncE/IEEE 1588v2
- Lowest power consumption with adaptive green mode
- Low latency with unique frame cut through for latency sensitive services
- Industry-leading system gain

NOTES: The highlight feature may not apply to all PTP 820/850 platform.

LINKPlanner

LINKPlanner is a free, easy-to-use link design tool that allows network operators to easily and quickly design networks. Microsoft® Windows® and Intel®-based Mac® versions of LINKPlanner can be downloaded from Cambium Networks' support pages.

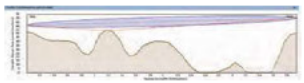
Key LINKPlanner features:

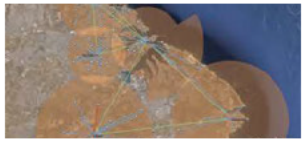
- Design a five-nines-reliable wireless link
- Plan and optimize a single link or multiple links simultaneously
- Perform calculations for both licensed and unlicensed products
- Automatically load path terrain profiles and environmental factors such as rain fade
- Display a comprehensive overview of your entire point-to-point wireless network via Google™ Earth
- Generate reports that validate projected performance and serve as time-saving deployment guidelines
- Create bills of material for point-to-multipoint and point-to-point networks including accessories

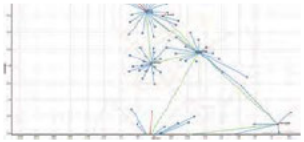
About Cambium Networks

Cambium Networks is a leading global provider of wireless connectivity solutions that strengthen connections between people, places and things. Specializing in providing an end-to-end wireless fabric of reliable, scalable, secure, cloud-managed platforms that perform under demanding conditions, Cambium Networks empowers service providers and enterprise, industrial and government network operators to build intelligent edge connectivity. Cambium Networks' commitment to continuous innovation in wireless access is demonstrated in the millions of radios deployed in thousands of networks that benefit communities around the world. Team members also contribute to social responsibility activities to serve the communities in which they live. Headquartered outside Chicago and with R&D centers in the U.S., U.K. and India, Cambium Networks sells through a range of trusted global distributors.

www.cambiumnetworks.com


PATH PROFILE WITH OBSTRUCTIONS


GOOGLE EARTH NETWORK VIEW


MAP OF THE SITES AND LINKS IN THE PROJECT

Cambium Networks™

Contact List

[redacted]

[redacted]

ATTACHMENT 4: SITE PLAN
KORBEL SITE
LOT 17079 ON DP142485
Accessed via Korbelka Road, Merredin

SHIRE OF MERREDIN
LOCAL PLANNING SCHEME No. 6

The Shire of Merredin under and by virtue of the provisions and powers conferred upon it in that behalf by Local Planning Scheme No. 6, hereby adopts the following Policy.

LOCAL PLANNING SCHEME POLICY No. 1
MOVEABLE BUILDINGS

DATE ADVERTISED:

DATE FINALLY ADOPTED: 21 / 03 / 2017

Applicable Date of Implementation 13 / 04 / 2017

1. DISCUSSION

The Council is keen to restrict these types of dwellings amongst the existing residential areas as they are considered inappropriate to, the standard of existing housing stock, and the expectations of residents or owners already established in the area. The Council considers it reasonable to protect existing owners' investments in the town from development that may detract from the amenity of the residential character.

2 DEFINITIONS

A PERMANENT building is generally not designed to be moved and includes the following;

a) ***'Site Built'*** structures are built on location as new permanent structures. They are of traditional appearance with pitched roofs and typical house layout, designed to accommodate families.

b) ***'Relocated'*** dwellings are structures that have previously been constructed on a site elsewhere. The structures that are relocated are not necessarily designed to be relocated.

A MOVEABLE building is generally any structure capable of being transported from one location to another. There are three basic types as follows;

a) ***'Transportable'*** structures are those designed and constructed at a location other than where they are intended to be established. For example dwellings prefabricated in Perth, transported in sections to their building site, and assembled on location.

b) ***'Donga Type'*** structures are those usually designed to provide for workforce accommodation in small individual units. The structures are generally those (such as ATCO, Western Portables or Durabuilt units) with skid mountings, metal sandwich panel

and flat roof design. These portable modular structures are also used for other purposes.

c) ***'Containers'***. These structures, although considered 'buildings' by definition under the Building Code of Australia, are solely constructed to transport other goods. They are not in themselves designed, nor suitable, for storage of goods in an urban environment. A container includes 'seatainers' and other large vessels designed to carry, and be carried on specially designed vehicles or transporters.

3 BACKGROUND

The use and reuse of moveable buildings is common. The downside of this trend is that the building stock may be second-hand, may contain undesirable materials like asbestos, and may be visually out of harmony with existing buildings in the locality. Many other Councils are not permitting buildings within their districts which contain asbestos. Without the appropriate controls Merredin could become a 'dumping ground' for such structures.

To ensure that the Council has the opportunity to consider such proposals, all applications for moveable buildings, as defined above, shall require the Council's Planning Consent prior to the issue of a Building Permit.

The Council has delegated authority to its Executive Manager Development Services to determine Applications for Planning Consent for all applications for ***transportable*** and ***relocated*** dwellings in zones of the Scheme where dwellings are permitted. The Executive Manager Development Services may impose appropriate conditions including the requirement for a bond or bank guarantee.

Donga type and ***Containers*** are subject to Council consideration.

4 POLICY

4.1 Council Policy on Moveable Buildings

a) All applications for moveable buildings, as defined above, shall require the Council's Planning Consent prior to the issue of a Building Permit. Generally the Council is not in favour of the use of moveable buildings, especially in the townsite areas, however the Council will consider each application on its merits.

b) The Council shall not permit the establishment, occupation or erection of ***donga type*** structures for residential purposes within a Townsite Boundary in the Scheme Area, unless the site is set aside for Group Housing Accommodation and used as a camp site for accommodating a workforce. In these circumstances it may be argued that the development is not a permanent improvement, and may justify the use of such structures. In this case the Council must be satisfied that the development will not detract from the amenity of the surrounding area.

c) The Council will only permit ***donga type*** structures for uses *other than* residential uses where it considers the use or establishment of the structure will not be in conflict with the objectives of this policy.

d) The Council will only permit ***site built*** and ***relocated*** structures where it is satisfied that the standard and quality of building can satisfactorily be integrated into a residential area, and that the buildings do not contain unacceptable materials.

e) The Council will not permit the storing or use of a ***'container'***, as defined above,

within a townsite area, other than in the areas zoned 'Industrial'. The Council considers the appearance, scale, and materials of these structures to be inappropriate for use in an urban environment, and are therefore in conflict with the objectives of the Scheme.

f) The Council may give special consideration for the use of ***'containers'*** outside the townsite areas of the Shire. In these circumstances the Council will need to be satisfied that there is no viable alternative to the use of these structures, and that the location of the ***'containers'*** will not detract from the amenity of the locality.

4.2 Measures to ensure Compliance with Planning Consent

When an application for Planning Consent for a Moveable Building is considered by the Council, or the Executive Manager Development Services, that Consent may be granted subject to conditions requiring the applicant, or owner, to:

a) lodge a bond or bank guarantee with the Council. The bond or bank guarantee will provide the surety for the completion of the moveable building to a standard acceptable to the Council;

b) specify matters which require attention and the manner in which work is required to be completed in order to satisfy standards acceptable to the Council.

c) obtain a special Building Permit of a specified duration.

5 OBJECTIVES OF POLICY

a) To maintain high amenity standards of buildings, especially within the residential areas in the Townsites of the Shire.

b) To ensure that the visual aesthetics of residential areas are not compromised by the introduction of moveable buildings that are generally out of character with the predominant housing style in the locality.

c) To ensure that the moveable buildings, established within the Shire, do not use materials considered by the Council to be unacceptable (eg. asbestos).

d) To avoid the erection and use of extensive areas of moveable structures for accommodating temporary workforces, or other business or company activities, in inappropriate areas.

e) To prevent the introduction of housing, or other use structures, that are designed to be used on a temporary or short stay basis and that may detract from the standards already established in the residential areas of the Townsites.

f) To protect the visual amenity of the urban environment by not permitting the establishment, storage or use of ***'containers'*** within the non-industrial areas of the townsite.

Greg Powell
CHIEF EXECUTIVE OFFICER