



TITLE: 28.80 m Steel Telecommunications Monopole  
 PROJECT: CHECKPOLE Samples  
 CODE: R-0001

Revolutio  
 Chris Hackney  
 Sunday, 25 July 2021 19:19:33

----- MONOPOLE DATA -----

MATERIAL: STEEL  
 SHAPE: CIRCULAR  
 SEGMENTS: 6  
 SURFACE: GALVANIZED  
 ASSEMBLED LENGTH: 28800 mm (TIP RL @ 29140 mm)  
 ELASTIC MODULUS: 200000 MPa  
 DENSITY: 7850 kg/m<sup>3</sup>  
 SHAFT MASS: 5870 kg

SHAFT

ID	LENGTH	TOP OD	BASE OD	t	fy	TAPER	MASS	JOINT
01	5400 mm	520.0 mm	637.0 mm	5.0 mm	320 MPa	21.67 mm/m	351 kg	950 mm LAP
02	5900 mm	606.0 mm	734.0 mm	8.0 mm	360 MPa	21.69 mm/m	768 kg	1000 mm LAP
03	5980 mm	694.7 mm	824.0 mm	8.0 mm	320 MPa	21.62 mm/m	884 kg	1220 mm LAP
04	5980 mm	781.6 mm	911.0 mm	10.0 mm	260 MPa	21.64 mm/m	1230 kg	1340 mm LAP
05	5980 mm	862.0 mm	992.0 mm	10.0 mm	310 MPa	21.74 mm/m	1329 kg	1460 mm LAP
06	5610 mm	940.0 mm	1062.0 mm	10.0 mm	310 MPa	21.75 mm/m	1308 kg	

< STRUCTURE BASE @ RL 250 mm (ABOVE GROUND) = PAD PLINTH HEIGHT (500 mm) + PAD BASE HEIGHT (1500 mm) - PAD BASE EMBEDMENT (1750 mm) >

CONNECTIONS

ANCHOR BOLTS

CONFIGURATION: CIRCULAR  
 DIAMETER: M36  
 QUANTITY: 24  
 PITCH CIRCLE DIAMETER: 1200 mm  
 EMBEDMENT: 900 mm  
 YIELD STRESS (fya): 420 MPa  
 ULTIMATE STRESS (fua): 520 MPa

BASE PLATE

SHAPE: CIRCULAR  
 VOID: CIRCULAR  
 WELD: BUTT  
 WIDTH (Wp): 1350 mm  
 VOID DIAMETER (dv): 750 mm  
 THICKNESS (tp): 50 mm  
 YIELD STRESS (fyp): 340 MPa (AS/NZS 3678 Table 9)  
 MASS: 375 kg

BACKING RING

CONFIGURATION: NONE

GUSSETS

QUANTITY: 12  
 HEIGHT (Hg): 300 mm  
 WIDTH (Wg): 144 mm  
 THICKNESS (tg): 12.0 mm  
 YIELD STRESS (fyg): 340 MPa  
 MASS: 24 kg

BEARING

TYPE: GROUT  
 GROUT STRESS (f'cb): 40 MPa  
 ELASTIC MODULUS (Eb): 29725 MPa (ACI 318-14 Section 19.2.2)  
 THICKNESS (tb): 40 mm

OPENINGS

ID	LOCATION	DOORS	Hd	Wd	Rd	REINFORCEMENT	Hr	Lr	tr	fyr
01	27800 mm	60° + 180° + 300°	700 mm	150 mm	75.0 mm	TYPE 1	-	50 mm	16.0 mm	300 MPa
02	25800 mm	60° + 180° + 300°	700 mm	150 mm	75.0 mm	TYPE 1	-	50 mm	16.0 mm	300 MPa
03	6310 mm	270°	1000 mm	225 mm	112.5 mm	TYPE 1	-	100 mm	16.0 mm	300 MPa
04	3000 mm	90°	1000 mm	225 mm	112.5 mm	TYPE 1	-	100 mm	16.0 mm	300 MPa
05	850 mm	90° + 270°	1000 mm	225 mm	112.5 mm	TYPE 1	-	100 mm	16.0 mm	300 MPa

----- SITE DATA -----

LOCATION

LATITUDE: -33.834392  
 LONGITUDE: 151.256418  
 ELEVATION: 86.00 m

DESIGN

REFERENCE: AS/NZS 1170  
 IMPORTANCE LEVEL: 2  
 LIFE: 50 YEARS

WIND

REGION: A2  
 ULTIMATE ARI: 500 YEARS

REGIONAL WIND SPEED (VR)

• Calculated as per AS/NZS 1170.2 Section 3.2.

ULTIMATE: 45 m/s  
 ICE: 34 m/s  
 SERVICEABILITY: 27 m/s

DIRECTION MULTIPLIER (Md)

• Calculated for Region A2 as per AS/NZS 1170.2 Section 3.3.

WIND Md

N 0.80  
 NE 0.80  
 E 0.80  
 SE 0.95  
 S 0.90  
 SW 0.95  
 W 1.00  
 NW 0.95

TERRAIN/HEIGHT MULTIPLIER (Mz,cat)

• Calculated using averaging as per AS/NZS 1170.2 Section 4.2.3 and varies with height.

NORTH WIND: Mz,cat = 0.9275 → 1.1917 (TC 1.78 → TC 1.31)

ZONE 1: TC 3 to 348.75 m  
 ZONE 2: TC 2.5 to 697.50 m  
 ZONE 3: TC 3 to 813.75 m  
 ZONE 4: TC 1 to 1860.00 m

NORTH EAST WIND: Mz,cat = 0.9125 → 1.1479 (TC 1.97 → TC 1.76)

ZONE 1: TC 2.5 to 116.25 m  
 ZONE 2: TC 3 to 232.50 m  
 ZONE 3: TC 2.5 to 581.25 m  
 ZONE 4: TC 1 to 697.50 m  
 ZONE 5: TC 2.5 to 1046.25 m  
 ZONE 6: TC 1 to 1162.50 m  
 ZONE 7: TC 2.5 to 1395.00 m  
 ZONE 8: TC 1 to 1860.00 m

EAST WIND: Mz,cat = 0.9675 → 1.2220 (TC 1.29 → TC 1.00)

ZONE 1: TC 2.5 to 348.75 m  
 ZONE 2: TC 1 to 1860.00 m

SOUTH EAST WIND: Mz,cat = 0.9575 → 1.2220 (TC 1.41 → TC 1.00)

ZONE 1: TC 3 to 116.25 m  
 ZONE 2: TC 2.5 to 465.00 m  
 ZONE 3: TC 1 to 1860.00 m

SOUTH WIND: Mz,cat = 0.9525 → 1.2220 (TC 1.47 → TC 1.00)

ZONE 1: TC 3 to 232.50 m  
 ZONE 2: TC 2.5 to 348.75 m  
 ZONE 3: TC 3 to 465.00 m  
 ZONE 4: TC 1 to 1860.00 m

SOUTH WEST WIND: Mz,cat = 0.8425 → 1.0134 (TC 2.84 → TC 2.92)

ZONE 1: TC 3 to 116.25 m  
 ZONE 2: TC 2.5 to 232.50 m  
 ZONE 3: TC 3 to 348.75 m  
 ZONE 4: TC 2.5 to 813.75 m  
 ZONE 5: TC 3 to 1860.00 m

WEST WIND: Mz,cat = 0.8375 → 1.0040 (TC 2.91 → TC 3.00)

ZONE 1: TC 2.5 to 232.50 m  
 ZONE 2: TC 3 to 465.00 m  
 ZONE 3: TC 2.5 to 581.25 m  
 ZONE 4: TC 3 to 1860.00 m

NORTH WEST WIND: Mz,cat = 1.0040 (TC 3.00)

ZONE 1: TC 3 to 1860.00 m

SHIELDING MULTIPLIER (Ms)

• Calculated as per AS/NZS 1170.2 Section 4.3 and varies with height.

NORTH WIND: Ms = 1.0

ID	HEIGHT	ELEVATION	SLOPE	AREA	BREADTH	LATITUDE	LONGITUDE
012	6.00 m	68.50 m	0.1015	290 m <sup>2</sup>	25.43 m	-33.832862	151.256125
013	6.00 m	72.00 m	0.0849	257 m <sup>2</sup>	20.34 m	-33.832914	151.256532
015	6.00 m	75.00 m	0.0909	234 m <sup>2</sup>	20.81 m	-33.833310	151.256293
016	6.00 m	76.00 m	0.0868	221 m <sup>2</sup>	20.81 m	-33.833400	151.256061
018	6.00 m	76.00 m	0.0879	214 m <sup>2</sup>	11.25 m	-33.833464	151.255902
020	6.00 m	76.00 m	0.0677	189 m <sup>2</sup>	18.68 m	-33.833069	151.256532
021	6.00 m	76.00 m	0.0539	183 m <sup>2</sup>	14.43 m	-33.832803	151.257024
022	6.00 m	79.50 m	0.0962	177 m <sup>2</sup>	17.48 m	-33.832982	151.256023
023	6.00 m	75.50 m	0.0811	169 m <sup>2</sup>	20.34 m	-33.833229	151.256436
024	6.00 m	69.50 m	0.0924	169 m <sup>2</sup>	19.51 m	-33.832793	151.256262
026	6.00 m	71.00 m	0.0939	161 m <sup>2</sup>	11.12 m	-33.833073	151.255739
027	6.00 m	76.00 m	0.0864	141 m <sup>2</sup>	16.09 m	-33.833367	151.256212
028	6.00 m	71.00 m	0.0938	132 m <sup>2</sup>	15.72 m	-33.833031	151.255867
050	6.00 m	5.50 m	0.1408	518 m <sup>2</sup>	34.40 m	-33.829264	151.256110
052	3.00 m	24.50 m	0.1568	455 m <sup>2</sup>	29.78 m	-33.830954	151.255484
055	3.00 m	31.50 m	0.2124	432 m <sup>2</sup>	19.88 m	-33.832227	151.255465 (not effective as average slope > 0.2)
063	3.00 m	57.50 m	0.1045	406 m <sup>2</sup>	23.58 m	-33.831942	151.256428
066	3.00 m	35.00 m	0.1327	400 m <sup>2</sup>	27.28 m	-33.830952	151.256051
072	3.00 m	30.00 m	0.2015	372 m <sup>2</sup>	17.11 m	-33.831988	151.255605 (not effective as average slope > 0.2)
076	3.00 m	43.00 m	0.1243	366 m <sup>2</sup>	20.90 m	-33.831288	151.256267
077	3.00 m	45.50 m	0.1813	366 m <sup>2</sup>	25.06 m	-33.832484	151.255671
079	3.00 m	21.00 m	0.1616	362 m <sup>2</sup>	17.57 m	-33.830915	151.255234
080	3.00 m	69.00 m	0.0530	357 m <sup>2</sup>	18.86 m	-33.831605	151.257307
086	3.00 m	86.50 m	0.0225	340 m <sup>2</sup>	10.53 m	-33.834237	151.256569
096	3.00 m	24.50 m	0.1145	313 m <sup>2</sup>	34.21 m	-33.829582	151.256851
097	3.00 m	56.00 m	0.0970	310 m <sup>2</sup>	20.16 m	-33.831622	151.256681
102	3.00 m	24.50 m	0.1770	299 m <sup>2</sup>	15.81 m	-33.831444	151.255182
106	3.00 m	57.50 m	0.0770	289 m <sup>2</sup>	19.14 m	-33.831164	151.257372
107	3.00 m	42.50 m	0.1181	287 m <sup>2</sup>	24.04 m	-33.831084	151.256416
111	3.00 m	79.50 m	0.0594	284 m <sup>2</sup>	20.81 m	-33.832129	151.257151
113	3.00 m	44.00 m	0.1532	282 m <sup>2</sup>	21.82 m	-33.831958	151.255972
114	3.00 m	23.50 m	0.1209	274 m <sup>2</sup>	22.56 m	-33.829749	151.256494
115	3.00 m	68.50 m	0.0593	272 m <sup>2</sup>	17.38 m	-33.831836	151.257258
117	3.00 m	39.00 m	0.1224	271 m <sup>2</sup>	22.56 m	-33.830942	151.256365
118	3.00 m	6.00 m	0.1493	271 m <sup>2</sup>	20.62 m	-33.829656	151.255385

119	3.00 m	27.50 m	0.1966	269 m <sup>2</sup>	25.80 m	-33.831838	151.255467
120	3.00 m	67.00 m	0.0749	263 m <sup>2</sup>	21.36 m	-33.832131	151.256760
121	3.00 m	44.50 m	0.1636	260 m <sup>2</sup>	17.57 m	-33.832151	151.255923
125	3.00 m	74.00 m	0.0522	251 m <sup>2</sup>	16.55 m	-33.832409	151.257113
127	3.00 m	24.00 m	0.1085	244 m <sup>2</sup>	16.09 m	-33.829280	151.256957
133	3.00 m	68.50 m	0.0767	233 m <sup>2</sup>	21.36 m	-33.832349	151.256621
144	3.00 m	51.50 m	0.0952	223 m <sup>2</sup>	19.14 m	-33.831165	151.256931
148	3.00 m	5.50 m	0.1397	215 m <sup>2</sup>	18.40 m	-33.829253	151.255688
177	3.00 m	71.50 m	0.0423	118 m <sup>2</sup>	6.93 m	-33.831556	151.257859

NORTH EAST WIND: Ms = 1.0

ID	HEIGHT	ELEVATION	SLOPE	AREA	BREADTH	LATITUDE	LONGITUDE
086	3.00 m	86.50 m	0.0225	340 m <sup>2</sup>	21.60 m	-33.834237	151.256569
095	3.00 m	80.50 m	0.0346	321 m <sup>2</sup>	25.93 m	-33.833684	151.257912
134	3.00 m	78.00 m	0.0342	232 m <sup>2</sup>	14.38 m	-33.832582	151.257704
147	3.00 m	76.00 m	0.0294	215 m <sup>2</sup>	17.90 m	-33.831790	151.258348
149	3.00 m	89.00 m	0.1012	214 m <sup>2</sup>	0.07 m	-33.834347	151.256734
150	3.00 m	79.00 m	0.0245	211 m <sup>2</sup>	18.41 m	-33.832244	151.258100
156	3.00 m	77.00 m	0.0277	183 m <sup>2</sup>	19.86 m	-33.831910	151.258276
158	3.00 m	79.50 m	0.0247	177 m <sup>2</sup>	19.19 m	-33.832385	151.257916
159	3.00 m	80.50 m	0.0447	176 m <sup>2</sup>	15.44 m	-33.833472	151.257154
163	3.00 m	78.50 m	0.0247	164 m <sup>2</sup>	15.46 m	-33.832083	151.258158
165	3.00 m	78.00 m	0.0465	162 m <sup>2</sup>	17.32 m	-33.833720	151.258092
172	3.00 m	80.00 m	0.0375	140 m <sup>2</sup>	14.88 m	-33.833217	151.257411
173	3.00 m	75.00 m	0.0339	137 m <sup>2</sup>	13.53 m	-33.831746	151.257894
174	3.00 m	75.00 m	0.0363	134 m <sup>2</sup>	11.87 m	-33.831915	151.257776
175	3.00 m	81.00 m	0.0306	124 m <sup>2</sup>	18.43 m	-33.833500	151.257819
176	3.00 m	80.00 m	0.0308	120 m <sup>2</sup>	13.32 m	-33.832929	151.257574
177	3.00 m	71.50 m	0.0423	118 m <sup>2</sup>	10.71 m	-33.831556	151.257859
179	3.00 m	75.00 m	0.0386	114 m <sup>2</sup>	10.99 m	-33.832053	151.257669
180	3.00 m	79.50 m	0.0408	113 m <sup>2</sup>	14.01 m	-33.833127	151.257225
188	3.00 m	81.50 m	0.0303	78 m <sup>2</sup>	12.72 m	-33.833468	151.257579
191	3.00 m	78.50 m	0.0414	66 m <sup>2</sup>	10.43 m	-33.832962	151.257358
192	3.00 m	79.00 m	0.0467	55 m <sup>2</sup>	10.99 m	-33.833187	151.257145
196	3.00 m	78.00 m	0.0370	50 m <sup>2</sup>	10.25 m	-33.833248	151.258306
197	3.00 m	77.50 m	0.0427	49 m <sup>2</sup>	9.24 m	-33.832815	151.257432
199	3.00 m	79.00 m	0.0409	44 m <sup>2</sup>	9.04 m	-33.833049	151.257318

EAST WIND: Ms = 1.0

ID	HEIGHT	ELEVATION	SLOPE	AREA	BREADTH	LATITUDE	LONGITUDE
149	3.00 m	89.00 m	0.1012	214 m <sup>2</sup>	21.34 m	-33.834347	151.256734
165	3.00 m	78.00 m	0.0465	162 m <sup>2</sup>	1.13 m	-33.833720	151.258092
171	3.00 m	90.00 m	0.2487	144 m <sup>2</sup>	4.76 m	-33.834495	151.256540 (not effective as average slope > 0.2)

SOUTH EAST WIND: Ms = 1.0

ID	HEIGHT	ELEVATION	SLOPE	AREA	BREADTH	LATITUDE	LONGITUDE
032	9.00 m	90.00 m	0.0673	1778 m <sup>2</sup>	42.79 m	-33.834878	151.256685
036	6.00 m	30.00 m	0.1262	955 m <sup>2</sup>	39.28 m	-33.836335	151.260610
039	6.00 m	65.00 m	0.0651	777 m <sup>2</sup>	37.47 m	-33.836781	151.258397
040	6.00 m	79.50 m	0.0288	716 m <sup>2</sup>	19.46 m	-33.836305	151.257226
042	6.00 m	87.50 m	0.0142	646 m <sup>2</sup>	14.69 m	-33.835298	151.256771
043	6.00 m	83.00 m	0.0188	644 m <sup>2</sup>	38.38 m	-33.835654	151.257231
044	6.00 m	85.00 m	0.0074	644 m <sup>2</sup>	28.51 m	-33.835504	151.256996
088	3.00 m	78.00 m	0.0320	337 m <sup>2</sup>	14.75 m	-33.836165	151.258077
171	3.00 m	90.00 m	0.2487	144 m <sup>2</sup>	15.16 m	-33.834495	151.256540 (not effective as average slope > 0.2)
181	3.00 m	77.50 m	0.0312	111 m <sup>2</sup>	23.01 m	-33.836269	151.258308
185	3.00 m	80.50 m	0.0285	98 m <sup>2</sup>	14.04 m	-33.835862	151.257527
190	3.00 m	78.50 m	0.0320	69 m <sup>2</sup>	13.64 m	-33.835982	151.258082
203	3.00 m	64.50 m	0.0621	26 m <sup>2</sup>	7.34 m	-33.836903	151.258623
204	3.00 m	33.00 m	0.1153	26 m <sup>2</sup>	6.95 m	-33.837011	151.260262

SOUTH WIND: Ms = 1.0

ID	HEIGHT	ELEVATION	SLOPE	AREA	BREADTH	LATITUDE	LONGITUDE
006	6.00 m	23.00 m	0.1521	735 m <sup>2</sup>	58.99 m	-33.837955	151.257707
032	9.00 m	90.00 m	0.0673	1778 m <sup>2</sup>	35.39 m	-33.834878	151.256685
033	9.00 m	23.50 m	0.1523	1006 m <sup>2</sup>	35.97 m	-33.837916	151.255112
037	6.00 m	92.00 m	0.0648	947 m <sup>2</sup>	31.58 m	-33.835139	151.255978
040	6.00 m	79.50 m	0.0288	716 m <sup>2</sup>	39.39 m	-33.836305	151.257226
041	6.00 m	86.50 m	0.0035	653 m <sup>2</sup>	47.62 m	-33.835666	151.256607
042	6.00 m	87.50 m	0.0142	646 m <sup>2</sup>	30.96 m	-33.835298	151.256771
043	6.00 m	83.00 m	0.0188	644 m <sup>2</sup>	6.08 m	-33.835654	151.257231
044	6.00 m	85.00 m	0.0074	644 m <sup>2</sup>	21.42 m	-33.835504	151.256996
046	6.00 m	17.50 m	0.1601	561 m <sup>2</sup>	41.05 m	-33.838225	151.256770
067	3.00 m	91.50 m	0.0869	399 m <sup>2</sup>	29.38 m	-33.834952	151.256299
068	3.00 m	90.50 m	0.1220	397 m <sup>2</sup>	17.97 m	-33.834672	151.256205
070	3.00 m	17.00 m	0.1440	380 m <sup>2</sup>	28.11 m	-33.838560	151.255121
093	3.00 m	23.00 m	0.1489	326 m <sup>2</sup>	38.09 m	-33.838190	151.256232
103	3.00 m	12.50 m	0.1471	298 m <sup>2</sup>	21.36 m	-33.838735	151.255047
123	3.00 m	23.00 m	0.1564	254 m <sup>2</sup>	33.29 m	-33.838003	151.256702
129	3.00 m	5.50 m	0.1550	244 m <sup>2</sup>	20.43 m	-33.838879	151.254874
130	3.00 m	78.00 m	0.0313	243 m <sup>2</sup>	23.69 m	-33.836551	151.255467
131	3.00 m	17.50 m	0.1404	242 m <sup>2</sup>	21.08 m	-33.838718	151.255564
132	3.00 m	79.00 m	0.0283	237 m <sup>2</sup>	25.06 m	-33.836545	151.255741
140	3.00 m	9.50 m	0.1464	226 m <sup>2</sup>	19.05 m	-33.838962	151.255128
157	3.00 m	82.00 m	0.0182	179 m <sup>2</sup>	4.92 m	-33.836174	151.255408
160	3.00 m	5.50 m	0.1452	173 m <sup>2</sup>	19.79 m	-33.839275	151.255240
161	3.00 m	73.00 m	0.0455	167 m <sup>2</sup>	15.35 m	-33.836920	151.255865
166	3.00 m	36.50 m	0.1220	160 m <sup>2</sup>	16.37 m	-33.837977	151.255632
168	3.00 m	76.00 m	0.0367	158 m <sup>2</sup>	22.10 m	-33.836839	151.256398
169	3.00 m	80.50 m	0.0253	146 m <sup>2</sup>	13.59 m	-33.836249	151.255679
170	3.00 m	14.00 m	0.1486	144 m <sup>2</sup>	15.63 m	-33.838554	151.254887
171	3.00 m	90.00 m	0.2487	144 m <sup>2</sup>	1.24 m	-33.834495	151.256540 (not effective as average slope > 0.2)
178	3.00 m	80.50 m	0.0250	118 m <sup>2</sup>	14.61 m	-33.836313	151.255857
182	3.00 m	80.50 m	0.0250	108 m <sup>2</sup>	9.89 m	-33.836342	151.256037
183	3.00 m	17.50 m	0.1449	102 m <sup>2</sup>	14.52 m	-33.838541	151.255321
184	3.00 m	6.50 m	0.1609	101 m <sup>2</sup>	13.96 m	-33.838593	151.254698
186	3.00 m	5.50 m	0.1523	91 m <sup>2</sup>	12.94 m	-33.838954	151.254834
187	3.00 m	5.50 m	0.1453	85 m <sup>2</sup>	12.48 m	-33.839244	151.255076
189	3.00 m	25.00 m	0.1362	76 m <sup>2</sup>	12.02 m	-33.838344	151.255501
195	3.00 m	6.00 m	0.1486	51 m <sup>2</sup>	9.89 m	-33.839170	151.255506
198	3.00 m	20.00 m	0.1421	48 m <sup>2</sup>	9.71 m	-33.838499	151.255525
200	3.00 m	22.00 m	0.1406	43 m <sup>2</sup>	9.52 m	-33.838409	151.255507
201	3.00 m	90.50 m	0.0513	40 m <sup>2</sup>	9.71 m	-33.835178	151.256495
202	3.00 m	6.50 m	0.1498	33 m <sup>2</sup>	7.21 m	-33.839113	151.255611

SOUTH WEST WIND: Ms = 1.0

ID	HEIGHT	ELEVATION	SLOPE	AREA	BREADTH	LATITUDE	LONGITUDE
031	9.00 m	76.50 m	0.0332	3349 m <sup>2</sup>	107.75 m	-33.836346	151.254403
034	6.00 m	23.50 m	0.1561	1000 m <sup>2</sup>	36.14 m	-33.837615	151.254497
037	6.00 m	92.00 m	0.0648	947 m <sup>2</sup>	17.63 m	-33.835139	151.255978
047	6.00 m	93.00 m	0.0914	554 m <sup>2</sup>	20.21 m	-33.834840	151.255790
053	3.00 m	91.50 m	0.0459	452 m <sup>2</sup>	35.69 m	-33.835317	151.255753
067	3.00 m	91.50 m	0.0869	399 m <sup>2</sup>	1.82 m	-33.834952	151.256299
068	3.00 m	90.50 m	0.1220	397 m <sup>2</sup>	13.57 m	-33.834672	151.256205
101	3.00 m	88.50 m	0.0169	300 m <sup>2</sup>	23.21 m	-33.835059	151.255034
130	3.00 m	78.00 m	0.0313	243 m <sup>2</sup>	5.47 m	-33.836551	151.255467
157	3.00 m	82.00 m	0.0182	179 m <sup>2</sup>	18.48 m	-33.836174	151.255408
162	3.00 m	87.50 m	0.0044	166 m <sup>2</sup>	13.51 m	-33.835581	151.253047
164	3.00 m	5.00 m	0.1487	163 m <sup>2</sup>	18.97 m	-33.838233	151.252769
167	3.00 m	86.50 m	0.0015	159 m <sup>2</sup>	14.36 m	-33.835674	151.253254
193	3.00 m	90.50 m	0.0406	53 m <sup>2</sup>	9.68 m	-33.835061	151.255529
194	3.00 m	5.50 m	0.1623	51 m <sup>2</sup>	9.59 m	-33.838204	151.253643

WEST WIND: Ms = 1.0

ID	HEIGHT	ELEVATION	SLOPE	AREA	BREADTH	LATITUDE	LONGITUDE
004	9.00 m	79.50 m	0.0432	250 m <sup>2</sup>	16.48 m	-33.833941	151.254883
038	6.00 m	73.50 m	0.0285	826 m <sup>2</sup>	28.83 m	-33.833334	151.251852
048	6.00 m	72.50 m	0.0452	540 m <sup>2</sup>	21.72 m	-33.833375	151.253430
049	6.00 m	70.00 m	0.0284	531 m <sup>2</sup>	29.72 m	-33.832542	151.250746
056	3.00 m	85.50 m	0.0012	425 m <sup>2</sup>	24.05 m	-33.834168	151.252072
057	3.00 m	84.00 m	0.0053	419 m <sup>2</sup>	22.26 m	-33.834194	151.252319
058	3.00 m	67.50 m	0.0357	415 m <sup>2</sup>	6.86 m	-33.832500	151.251292
059	3.00 m	84.50 m	0.0053	415 m <sup>2</sup>	28.28 m	-33.834394	151.253341
062	3.00 m	66.50 m	0.0406	409 m <sup>2</sup>	5.09 m	-33.832611	151.251691
065	3.00 m	84.00 m	0.0047	401 m <sup>2</sup>	19.59 m	-33.834064	151.251792
069	3.00 m	82.50 m	0.0107	387 m <sup>2</sup>	23.38 m	-33.834281	151.252893
082	3.00 m	74.00 m	0.0299	353 m <sup>2</sup>	23.04 m	-33.833369	151.252250
090	3.00 m	68.50 m	0.0395	333 m <sup>2</sup>	3.94 m	-33.832774	151.252041
094	3.00 m	89.50 m	0.0080	325 m <sup>2</sup>	24.05 m	-33.834510	151.251684
098	3.00 m	78.50 m	0.0207	307 m <sup>2</sup>	19.37 m	-33.833927	151.252546
099	3.00 m	72.50 m	0.0242	306 m <sup>2</sup>	16.59 m	-33.832813	151.250688
100	3.00 m	78.00 m	0.0252	306 m <sup>2</sup>	20.59 m	-33.834014	151.253021
104	3.00 m	87.50 m	0.0034	293 m <sup>2</sup>	17.03 m	-33.834293	151.251714
105	3.00 m	77.00 m	0.0375	291 m <sup>2</sup>	16.59 m	-33.833784	151.253931
108	3.00 m	78.50 m	0.0195	287 m <sup>2</sup>	19.37 m	-33.833907	151.252308
109	3.00 m	74.00 m	0.0349	287 m <sup>2</sup>	20.82 m	-33.833503	151.252852
110	3.00 m	76.00 m	0.0186	287 m <sup>2</sup>	22.38 m	-33.833131	151.250797
112	3.00 m	84.00 m	0.0056	284 m <sup>2</sup>	19.37 m	-33.834250	151.252578
116	3.00 m	76.00 m	0.0172	272 m <sup>2</sup>	28.28 m	-33.832981	151.250360
122	3.00 m	73.50 m	0.0341	254 m <sup>2</sup>	20.15 m	-33.833439	151.252621
124	3.00 m	74.50 m	0.0234	252 m <sup>2</sup>	23.27 m	-33.833241	151.251294
126	3.00 m	80.50 m	0.0094	246 m <sup>2</sup>	19.37 m	-33.833504	151.250212
128	3.00 m	76.00 m	0.0210	244 m <sup>2</sup>	21.60 m	-33.833305	151.251445
135	3.00 m	76.50 m	0.0167	231 m <sup>2</sup>	22.26 m	-33.833050	151.250470
136	3.00 m	75.00 m	0.0380	227 m <sup>2</sup>	14.36 m	-33.833693	151.253405
137	3.00 m	76.00 m	0.0179	227 m <sup>2</sup>	21.37 m	-33.833063	151.250599
138	3.00 m	78.00 m	0.0236	227 m <sup>2</sup>	15.36 m	-33.833975	151.252793
139	3.00 m	80.50 m	0.0131	226 m <sup>2</sup>	19.26 m	-33.833833	151.251917
141	3.00 m	93.00 m	0.0160	225 m <sup>2</sup>	19.59 m	-33.834786	151.251702
142	3.00 m	74.00 m	0.0412	225 m <sup>2</sup>	13.91 m	-33.833591	151.253422
143	3.00 m	71.00 m	0.0298	223 m <sup>2</sup>	17.37 m	-33.832937	151.251259
145	3.00 m	88.00 m	0.0051	220 m <sup>2</sup>	20.82 m	-33.834563	151.252188
146	3.00 m	76.00 m	0.0198	220 m <sup>2</sup>	20.59 m	-33.833238	151.251127
151	3.00 m	75.00 m	0.0239	203 m <sup>2</sup>	18.59 m	-33.833329	151.251606
152	3.00 m	79.50 m	0.0161	201 m <sup>2</sup>	17.37 m	-33.833853	151.252102
153	3.00 m	72.00 m	0.0249	197 m <sup>2</sup>	14.14 m	-33.832709	151.250689
154	3.00 m	80.00 m	0.0138	193 m <sup>2</sup>	20.15 m	-33.833800	151.251766
155	3.00 m	76.00 m	0.0498	185 m <sup>2</sup>	12.87 m	-33.833715	151.254405
162	3.00 m	87.50 m	0.0044	166 m <sup>2</sup>	6.97 m	-33.835581	151.253047

NORTH WEST WIND: Ms = 1.0

ID	HEIGHT	ELEVATION	SLOPE	AREA	BREADTH	LATITUDE	LONGITUDE
001	9.00 m	62.00 m	0.1066	441 m <sup>2</sup>	27.89 m	-33.832800	151.254918
002	9.00 m	72.00 m	0.0804	296 m <sup>2</sup>	26.49 m	-33.833291	151.255080
003	9.00 m	75.00 m	0.0663	281 m <sup>2</sup>	22.86 m	-33.833521	151.254961
004	9.00 m	79.50 m	0.0432	250 m <sup>2</sup>	3.65 m	-33.833941	151.254883
005	9.00 m	77.00 m	0.0580	195 m <sup>2</sup>	17.88 m	-33.833793	151.254904
007	6.00 m	73.00 m	0.0820	386 m <sup>2</sup>	30.00 m	-33.833331	151.255273
008	6.00 m	78.00 m	0.0704	314 m <sup>2</sup>	18.17 m	-33.833525	151.255768
009	6.00 m	78.00 m	0.0665	309 m <sup>2</sup>	20.24 m	-33.833759	151.255364
010	6.00 m	78.50 m	0.0675	300 m <sup>2</sup>	17.27 m	-33.833628	151.255644
011	6.00 m	71.50 m	0.0765	292 m <sup>2</sup>	24.67 m	-33.833240	151.254908
014	6.00 m	74.00 m	0.0778	248 m <sup>2</sup>	23.56 m	-33.833281	151.255423
017	6.00 m	79.50 m	0.0589	217 m <sup>2</sup>	15.99 m	-33.833723	151.255537
018	6.00 m	76.00 m	0.0879	214 m <sup>2</sup>	13.46 m	-33.833464	151.255902
019	6.00 m	78.00 m	0.0614	213 m <sup>2</sup>	18.61 m	-33.833800	151.255203
025	6.00 m	72.50 m	0.0858	168 m <sup>2</sup>	12.75 m	-33.833147	151.255611
026	6.00 m	71.00 m	0.0939	161 m <sup>2</sup>	9.95 m	-33.833073	151.255739
029	3.00 m	76.00 m	0.0627	242 m <sup>2</sup>	21.93 m	-33.833678	151.254923
030	3.00 m	73.00 m	0.0718	43 m <sup>2</sup>	9.02 m	-33.833404	151.254863
035	6.00 m	67.00 m	0.0332	979 m <sup>2</sup>	51.59 m	-33.832188	151.250825
045	6.00 m	64.00 m	0.0373	568 m <sup>2</sup>	32.57 m	-33.831645	151.250968
048	6.00 m	72.50 m	0.0452	540 m <sup>2</sup>	22.06 m	-33.833375	151.253430
049	6.00 m	70.00 m	0.0284	531 m <sup>2</sup>	8.89 m	-33.832542	151.250746
051	3.00 m	44.00 m	0.0819	473 m <sup>2</sup>	24.08 m	-33.831439	151.252158
054	3.00 m	68.50 m	0.0509	445 m <sup>2</sup>	30.90 m	-33.832878	151.253180
055	3.00 m	31.50 m	0.2124	432 m <sup>2</sup>	7.34 m	-33.832227	151.255465 (not effective as average slope > 0.2)
058	3.00 m	67.50 m	0.0357	415 m <sup>2</sup>	27.64 m	-33.832500	151.251292
060	3.00 m	58.50 m	0.0542	412 m <sup>2</sup>	26.90 m	-33.831751	151.251951
061	3.00 m	60.50 m	0.0566	411 m <sup>2</sup>	33.49 m	-33.832204	151.252317
062	3.00 m	66.50 m	0.0406	409 m <sup>2</sup>	30.21 m	-33.832611	151.251691
064	3.00 m	41.50 m	0.1145	404 m <sup>2</sup>	33.91 m	-33.831715	151.253722
071	3.00 m	43.50 m	0.1705	375 m <sup>2</sup>	22.41 m	-33.832484	151.255006
073	3.00 m	71.00 m	0.0583	369 m <sup>2</sup>	26.52 m	-33.833236	151.254011
074	3.00 m	60.00 m	0.0591	368 m <sup>2</sup>	27.04 m	-33.832144	151.252502
075	3.00 m	53.00 m	0.0651	367 m <sup>2</sup>	19.35 m	-33.831622	151.252063
078	3.00 m	58.50 m	0.0532	364 m <sup>2</sup>	30.16 m	-33.831794	151.251779
081	3.00 m	52.00 m	0.0611	355 m <sup>2</sup>	29.64 m	-33.831355	151.251643
083	3.00 m	43.50 m	0.1282	351 m <sup>2</sup>	21.56 m	-33.831997	151.254287
084	3.00 m	68.00 m	0.0497	348 m <sup>2</sup>	27.27 m	-33.832811	151.252995

TITLE: 28.80 m Steel Telecommunications Monopole  
 PROJECT: CHECKPOLE Samples  
 CODE: R-0001

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 Chris Hackney  
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085	3.00 m	40.50 m	0.1074	342 m <sup>2</sup>	24.23 m	-33.831537	151.253388
087	3.00 m	59.50 m	0.0539	340 m <sup>2</sup>	25.77 m	-33.832109	151.251866
089	3.00 m	47.50 m	0.0796	333 m <sup>2</sup>	17.53 m	-33.831626	151.252383
090	3.00 m	68.50 m	0.0395	333 m <sup>2</sup>	30.03 m	-33.832774	151.252041
091	3.00 m	60.50 m	0.0544	333 m <sup>2</sup>	23.13 m	-33.832188	151.252098
092	3.00 m	66.50 m	0.0484	328 m <sup>2</sup>	26.98 m	-33.832602	151.252626
155	3.00 m	76.00 m	0.0498	185 m <sup>2</sup>	10.25 m	-33.833715	151.254405

TOPOGRAPHIC MULTIPLIER (Mt)

- Calculated as per AS/NZS 1170.2 Section 4.4 and varies with height.
- Elevation data based on "DEFAULT" dataset (this can be edited in Settings > Wind).

WIND	CRITICAL	TOPOGRAPHY	H	Lu	x	Mh	Mt
N	NNW	Ridge	85.50 m	239.05 m	-19.15 m	1.2681 → 1.1971	1.2681 → 1.1971
NE	ENE	Escarpment	82.50 m	158.67 m	120.26 m	1.3258 → 1.2112	1.3258 → 1.2112
E	E	Escarpment	84.00 m	144.43 m	99.16 m	1.3736 → 1.2340	1.3736 → 1.2340
SE	ESE	Escarpment	85.00 m	180.18 m	79.53 m	1.3285 → 1.2223	1.3285 → 1.2223
S	SSW	Ridge	88.00 m	266.79 m	79.64 m	1.2075 → 1.1569	1.2075 → 1.1569
SW	SSW	Ridge	88.00 m	266.79 m	79.64 m	1.2075 → 1.1569	1.2075 → 1.1569
W	WNW	Ridge	22.00 m	160.12 m	-19.43 m	1.0999 → 1.0649	1.0999 → 1.0649
NW	NNW	Ridge	85.50 m	239.05 m	-19.15 m	1.2681 → 1.1971	1.2681 → 1.1971

ICE

REGION: N/A

----- SHAFT DRAG -----

- Monopole Shaft Drag Factor (Cd) has been calculated as per AS/NZS 1170.2 Table E3, accounting for variations in wind speed and monopole width with height and the presence of access systems and linear loads as per Note 3.

----- ACCESS SYSTEM -----

TYPE: LADDER  
 STRINGER: TUBE  
 TOP HEIGHT: 28530 mm  
 BASE HEIGHT: 5741 mm  
 AZIMUTH: 0°  
 STRINGER DEPTH: 50 mm  
 STRINGER THICKNESS: 5.0 mm  
 STRINGER FACE OFFSET: 179 mm  
 PEG SPACING: 500 mm  
 PEG LENGTH: 215 mm  
 TOTAL MASS: 177 kg

----- HEADFRAMES -----

HEADFRAME H01

⌀ RL: 31.00 m  
 EPA: 1.00 m<sup>2</sup>  
 MASS: 250.00 kg  
 TYPE: TURRET  
 LIVE LOAD: 0.00 kPa  
 FLOOR AREA: 0.00 m<sup>2</sup>

DESIGN LOADS

WIND	Wu	Ws
N	1.58 kN	0.57 kN
NE	1.50 kN	0.54 kN
E	1.77 kN	0.64 kN
SE	2.45 kN	0.88 kN
S	1.97 kN	0.71 kN
SW	1.51 kN	0.54 kN
W	1.39 kN	0.50 kN
NW	1.58 kN	0.57 kN

HEADFRAME H02

⌀ RL: 27.50 m  
 EPA: 2.50 m<sup>2</sup>  
 MASS: 600.00 kg  
 TYPE: TRIANGULAR  
 LIVE LOAD: 0.25 kPa  
 FLOOR AREA: 4.50 m<sup>2</sup>

DESIGN LOADS

WIND	Wu	Ws
N	3.88 kN	1.40 kN
NE	3.73 kN	1.34 kN
E	4.42 kN	1.59 kN
SE	6.10 kN	2.20 kN
S	4.88 kN	1.76 kN
SW	3.68 kN	1.33 kN
W	3.37 kN	1.21 kN
NW	3.85 kN	1.39 kN

----- ANCILLARY GROUPS -----

ANCILLARIES G01: 3 × RFS AP909016-CT0

⌀ RL: 31.00 m  
 MASS: 45.00 kg  
 OFFSET: 0 mm

G01-01: 1 × RFS AP909016-CT0 @ 35° (0% SHIELDING)

G01-02: 1 x RFS AP909016-CT0 @ 170° (0% SHIELDING)

G01-03: 1 x RFS AP909016-CT0 @ 310° (0% SHIELDING)

DESIGN LOADS

WIND	EPA	Wu	Ws
N	3.03 m <sup>2</sup>	4.80 kN	1.73 kN
NE	2.81 m <sup>2</sup>	4.22 kN	1.52 kN
E	2.69 m <sup>2</sup>	4.76 kN	1.71 kN
SE	2.91 m <sup>2</sup>	7.12 kN	2.56 kN
S	3.03 m <sup>2</sup>	5.96 kN	2.15 kN
SW	2.80 m <sup>2</sup>	4.22 kN	1.52 kN
W	2.70 m <sup>2</sup>	3.75 kN	1.35 kN
NW	2.93 m <sup>2</sup>	4.64 kN	1.67 kN

ANCILLARIES G02: 12 x CommScope RV4PX308R

⌀ RL: 27.50 m  
 MASS: 360.00 kg  
 OFFSET: 0 mm

G02-01: 4 x CommScope RV4PX308R @ 35° (0% SHIELDING)

G02-02: 4 x CommScope RV4PX308R @ 170° (0% SHIELDING)

G02-03: 4 x CommScope RV4PX308R @ 310° (0% SHIELDING)

DESIGN LOADS

WIND	EPA	Wu	Ws
N	8.60 m <sup>2</sup>	13.34 kN	4.80 kN
NE	6.96 m <sup>2</sup>	10.38 kN	3.74 kN
E	6.16 m <sup>2</sup>	10.90 kN	3.93 kN
SE	7.84 m <sup>2</sup>	19.14 kN	6.89 kN
S	8.60 m <sup>2</sup>	16.78 kN	6.04 kN
SW	6.96 m <sup>2</sup>	10.24 kN	3.69 kN
W	6.16 m <sup>2</sup>	8.30 kN	2.99 kN
NW	7.84 m <sup>2</sup>	12.08 kN	4.35 kN

ANCILLARIES G03: 1 x Microwave Ø1200 Shroud Dish

⌀ RL: 25.00 m  
 MASS: 77.00 kg  
 OFFSET: 920 mm @ 90°

G03-01: 1 x Microwave Ø1200 Shroud Dish @ 110° (0% SHIELDING)

DESIGN LOADS

WIND	EPA	Wu	Ws
N	0.86 m <sup>2</sup>	1.31 kN	0.47 kN
NE	1.03 m <sup>2</sup>	1.52 kN	0.55 kN
E	1.43 m <sup>2</sup>	2.53 kN	0.91 kN
SE	1.41 m <sup>2</sup>	3.44 kN	1.24 kN
S	0.93 m <sup>2</sup>	1.80 kN	0.65 kN
SW	0.89 m <sup>2</sup>	1.28 kN	0.46 kN
W	1.11 m <sup>2</sup>	1.46 kN	0.53 kN
NW	1.11 m <sup>2</sup>	1.67 kN	0.60 kN

----- LINEAR LOADS -----

LOAD L01: NEMA 20C Cable Ladder

TOP ⌀ RL: 26.80 m  
 BASE ⌀ RL: 3.00 m  
 WIDTH: 300 mm  
 DEPTH: 155 mm  
 MASS: 30.00 kg/m  
 FACE OFFSET: 80 mm @ 270°

----- ANALYSIS -----

- Elastic Critical Buckling Load (Ncr) is 1298.68 kN.
- Minimum First Mode Natural Frequency (n1) is 0.9682 Hz for 1.2 G + Wu.
- Maximum Ultimate Moment (M\*) is 2365.70 kN·m @ RL 0.0 mm under South East Wind for 1.2 G + Wu.
- Maximum Ultimate Torsion (T\*) is 7.06 kN·m @ RL 2368.0 mm under North West Wind for 1.2 G + Wu.
- Maximum Ultimate Shear (V\*) is 123.31 kN @ RL 0.0 mm under South East Wind for 1.2 G + Wu.
- Maximum Ultimate Axial (N\*) is 98.44 kN @ RL 340.0 mm for 1.2 G + 1.5 Q.
- Maximum Serviceability Rotation (θ\*) is 1.3102° @ RL 2880.0 mm under South East Wind for G + Ws.
- Maximum Serviceability Deflection (δ\*) is 373 mm @ RL 2880.0 mm under South East Wind for G + Ws.
- Ratio of attachment area to shaft area in top third exceeds 10% (250.00%), such that cross-wind response can be ignored As per CSA S37 Annex N.2.1.

----- SHAFT DESIGN (AS 4100) -----

• Monopole FAILS at the following locations:

LOAD CASE 01: 1.2 G + Wu

SOUTH EAST WIND

RL	φMb	φMz	φVv	φNs	φMi	φVvm	φVvz	UTILISATION
4150.0 mm	2002.83 kN·m	2408.69 kN·m	3035.50 kN	6939.48 kN	1822.45 kN·m	2125.02 kN	0.0559	[103.03%]
3889.0 mm	2020.89 kN·m	2437.46 kN·m	3053.48 kN	6960.23 kN	1836.16 kN·m	2106.98 kN	0.0567	[103.87%]

3628.0 mm	2038.59 kN-m	2465.90 kN-m	3071.15 kN	6980.05 kN	1850.64 kN-m	2087.11 kN	0.0575	[104.68%]
3000.0 mm	2048.76 kN-m	2541.72 kN-m	3165.77 kN	7028.89 kN	1855.95 kN-m	1996.60 kN	0.0609	[108.27%]
2368.0 mm	2125.87 kN-m	2606.88 kN-m	3157.33 kN	7077.68 kN	1921.65 kN-m	1996.11 kN	0.0616	[108.40%]
2107.0 mm	2144.21 kN-m	2636.81 kN-m	3175.31 kN	7097.70 kN	1936.48 kN-m	1977.73 kN	0.0624	[109.15%]
1846.0 mm	2162.61 kN-m	2666.91 kN-m	3193.29 kN	7118.37 kN	1951.33 kN-m	1958.91 kN	0.0632	[109.90%]
1585.0 mm	2180.80 kN-m	2696.65 kN-m	3210.97 kN	7138.16 kN	1965.95 kN-m	1939.06 kN	0.0641	[110.66%]
850.0 mm	2229.03 kN-m	2807.29 kN-m	3374.18 kN	7193.57 kN	2004.20 kN-m	1941.80 kN	0.0645	[112.92%]
325.0 mm	2270.30 kN-m	2844.54 kN-m	3297.45 kN	7233.31 kN	2037.46 kN-m	1848.17 kN	0.0681	[114.18%]

LOAD CASE 02: 0.9 G + Wu

SOUTH EAST WIND

RL	φMb	φMz	φVv	φNs	φMi	φVvm	φVvz	UTILISATION
4150.0 mm	2002.83 kN-m	2408.69 kN-m	3035.50 kN	6939.48 kN	1867.54 kN-m	2146.97 kN	0.0553	[100.05%]
3889.0 mm	2020.89 kN-m	2437.46 kN-m	3053.48 kN	6960.23 kN	1882.34 kN-m	2129.00 kN	0.0561	[100.84%]
3628.0 mm	2038.59 kN-m	2465.90 kN-m	3071.15 kN	6980.05 kN	1897.63 kN-m	2109.36 kN	0.0569	[101.60%]
3000.0 mm	2048.76 kN-m	2541.72 kN-m	3165.77 kN	7028.89 kN	1904.15 kN-m	2019.69 kN	0.0602	[105.04%]
2368.0 mm	2125.87 kN-m	2606.88 kN-m	3157.33 kN	7077.68 kN	1972.71 kN-m	2018.41 kN	0.0609	[105.12%]
2107.0 mm	2144.21 kN-m	2636.81 kN-m	3175.31 kN	7097.70 kN	1988.41 kN-m	2000.02 kN	0.0617	[105.82%]
1846.0 mm	2162.61 kN-m	2666.91 kN-m	3193.29 kN	7118.37 kN	2004.15 kN-m	1981.18 kN	0.0626	[106.53%]
1585.0 mm	2180.80 kN-m	2696.65 kN-m	3210.97 kN	7138.16 kN	2019.66 kN-m	1961.37 kN	0.0634	[107.25%]
850.0 mm	2229.03 kN-m	2807.29 kN-m	3374.18 kN	7193.57 kN	2060.41 kN-m	1964.76 kN	0.0638	[109.38%]
325.0 mm	2270.30 kN-m	2844.54 kN-m	3297.45 kN	7233.31 kN	2095.67 kN-m	1870.19 kN	0.0673	[110.56%]

----- CONNECTION DESIGN (AS 4100) -----

- Anchor Bolts PASS with a critical utilisation of [74.57%] @ 0° under South East Wind for 0.9 G + Wu.
- Base Plate PASSES with a critical utilisation of [71.47%] @ 45° under South East Wind for 0.9 G + Wu.
- Gussets PASS with a critical utilisation of [89.92%] @ 0° under South East Wind for 0.9 G + Wu.
- Grout PASSES with a critical utilisation of [96.53%] @ 135° under South East Wind for 0.9 G + Wu.

----- FATIGUE DESIGN (LRFD LTS-1) -----

MEAN WIND SPEED: 5.5 m/s  
 DAILY STRESS CYCLES: 23000 (AASHTO LRFD LTS-1 Table 17.5.2.5)

• A mean wind speed of 5.5 m/s is based on measurements recorded 1.00 km away (-33.8405, 151.2643) at Sydney Harbour (Wedding Cake West) (066196) between 1998-2019 and sourced from BOM.

• Infinite Life criteria not met under the following conditions:

LOAD CASE 05: Wf

NORTH WIND

RL	DETAIL	DESCRIPTION	STRESS	INFINITE LIMIT	FINITE LIFE	UTILISATION
6310.0 mm	DETAIL 3.2	REINFORCED OPENING	127.90 MPa (K = 4.0)	110 MPa	39.58 years	[116.27%]
3000.0 mm	DETAIL 3.2	REINFORCED OPENING	142.68 MPa (K = 4.0)	110 MPa	28.50 years	[129.71%]
850.0 mm	DETAIL 3.2	REINFORCED OPENING	145.82 MPa (K = 4.0)	110 MPa	26.69 years	[132.56%]
0.0 mm	DETAIL 6.2	STIFFENED WELDED PLATE	20.25 MPa	18 MPa	911.10 years	[112.50%]
0.0 mm	DETAIL 2.3	24 x M36 BOLTS	53.48 MPa	48 MPa	99.11 years	[111.42%]

NORTH EAST WIND

RL	DETAIL	DESCRIPTION	STRESS	INFINITE LIMIT	FINITE LIFE	UTILISATION
6310.0 mm	DETAIL 3.2	REINFORCED OPENING	122.42 MPa (K = 4.0)	110 MPa	45.14 years	[111.29%]
3000.0 mm	DETAIL 3.2	REINFORCED OPENING	137.03 MPa (K = 4.0)	110 MPa	32.17 years	[124.57%]
850.0 mm	DETAIL 3.2	REINFORCED OPENING	140.28 MPa (K = 4.0)	110 MPa	29.98 years	[127.53%]
0.0 mm	DETAIL 6.2	STIFFENED WELDED PLATE	19.50 MPa	18 MPa	1024.19 years	[108.33%]
0.0 mm	DETAIL 2.3	24 x M36 BOLTS	51.48 MPa	48 MPa	111.07 years	[107.25%]

EAST WIND

RL	DETAIL	DESCRIPTION	STRESS	INFINITE LIMIT	FINITE LIFE	UTILISATION
3000.0 mm	DETAIL 3.2	REINFORCED OPENING	116.33 MPa (K = 4.0)	110 MPa	52.61 years	[105.75%]
850.0 mm	DETAIL 3.2	REINFORCED OPENING	118.69 MPa (K = 4.0)	110 MPa	49.50 years	[107.90%]

SOUTH EAST WIND

RL	DETAIL	DESCRIPTION	STRESS	INFINITE LIMIT	FINITE LIFE	UTILISATION
6310.0 mm	DETAIL 3.2	REINFORCED OPENING	127.82 MPa (K = 4.0)	110 MPa	39.63 years	[116.20%]
3000.0 mm	DETAIL 3.2	REINFORCED OPENING	142.55 MPa (K = 4.0)	110 MPa	28.57 years	[129.59%]
850.0 mm	DETAIL 3.2	REINFORCED OPENING	145.63 MPa (K = 4.0)	110 MPa	26.81 years	[132.39%]
0.0 mm	DETAIL 6.2	STIFFENED WELDED PLATE	20.23 MPa	18 MPa	918.61 years	[112.39%]
0.0 mm	DETAIL 2.3	24 x M36 BOLTS	53.40 MPa	48 MPa	99.73 years	[111.25%]

SOUTH WIND

RL	DETAIL	DESCRIPTION	STRESS	INFINITE LIMIT	FINITE LIFE	UTILISATION
6310.0 mm	DETAIL 3.2	REINFORCED OPENING	124.54 MPa (K = 4.0)	110 MPa	42.83 years	[113.22%]
3000.0 mm	DETAIL 3.2	REINFORCED OPENING	138.72 MPa (K = 4.0)	110 MPa	30.99 years	[126.11%]
850.0 mm	DETAIL 3.2	REINFORCED OPENING	141.71 MPa (K = 4.0)	110 MPa	29.07 years	[128.83%]
0.0 mm	DETAIL 6.2	STIFFENED WELDED PLATE	19.68 MPa	18 MPa	998.45 years	[109.33%]
0.0 mm	DETAIL 2.3	24 x M36 BOLTS	51.97 MPa	48 MPa	108.25 years	[108.27%]

SOUTH WEST WIND

RL	DETAIL	DESCRIPTION	STRESS	INFINITE LIMIT	FINITE LIFE	UTILISATION
6310.0 mm	DETAIL 3.2	REINFORCED OPENING	134.17 MPa (K = 4.0)	110 MPa	34.25 years	[121.97%]
3000.0 mm	DETAIL 3.2	REINFORCED OPENING	151.64 MPa (K = 4.0)	110 MPa	23.74 years	[137.85%]
850.0 mm	DETAIL 3.2	REINFORCED OPENING	156.04 MPa (K = 4.0)	110 MPa	21.79 years	[141.85%]
0.0 mm	DETAIL 6.2	STIFFENED WELDED PLATE	21.72 MPa	18 MPa	741.57 years	[120.67%]
0.0 mm	DETAIL 2.3	24 x M36 BOLTS	57.35 MPa	48 MPa	80.58 years	[119.48%]

WEST WIND

RL	DETAIL	DESCRIPTION	STRESS	INFINITE LIMIT	FINITE LIFE	UTILISATION
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6310.0 mm	DETAIL 3.2	REINFORCED OPENING	128.35 MPa (K = 4.0)	110 MPa	39.17 years	[116.68%]
3000.0 mm	DETAIL 3.2	REINFORCED OPENING	145.25 MPa (K = 4.0)	110 MPa	27.00 years	[132.05%]
850.0 mm	DETAIL 3.2	REINFORCED OPENING	149.59 MPa (K = 4.0)	110 MPa	24.72 years	[135.99%]
0.0 mm	DETAIL 6.2	STIFFENED WELDED PLATE	20.83 MPa	18 MPa	840.32 years	[115.72%]
0.0 mm	DETAIL 2.3	24 x M36 BOLTS	55.00 MPa	48 MPa	91.24 years	[114.58%]

NORTH WEST WIND

RL	DETAIL	DESCRIPTION	STRESS	INFINITE LIMIT	FINITE LIFE	UTILISATION
6310.0 mm	DETAIL 3.2	REINFORCED OPENING	139.61 MPa (K = 4.0)	110 MPa	30.41 years	[126.92%]
3000.0 mm	DETAIL 3.2	REINFORCED OPENING	157.41 MPa (K = 4.0)	110 MPa	21.22 years	[143.10%]
850.0 mm	DETAIL 3.2	REINFORCED OPENING	161.74 MPa (K = 4.0)	110 MPa	19.57 years	[147.04%]
0.0 mm	DETAIL 6.2	STIFFENED WELDED PLATE	22.50 MPa	18 MPa	667.47 years	[125.00%]
0.0 mm	DETAIL 2.3	24 x M36 BOLTS	59.42 MPa	48 MPa	72.32 years	[123.79%]

----- FOUNDATION DESIGN -----

STRATA

GEOTECHNICAL FACTOR OF SAFETY (FOS): 3.00 (refer site geotechnical report)  
 GEOTECHNICAL STRENGTH REDUCTION FACTOR ( $\phi$ ): 0.50 (AS 5100.3 Table 10.3.3(A))

ID	TYPE	CLASS	DEPTH	$\gamma$	$p_a$	$\mu$
01	CLAY	V. SOFT	1.00 m	18.0 kN/m <sup>3</sup>	50 kPa	0.40
02	SANDY CLAY	FIRM	2.50 m	17.5 kN/m <sup>3</sup>	100 kPa	0.40
03	SAND	MEDIUM	5.00 m	16.0 kN/m <sup>3</sup>	250 kPa	0.45

• Base of foundation sits within Strata Layer #02.

PAD FOUNDATION

ORIENTATION: 0.0°  
 PLINTH: CIRCULAR  
 PLINTH WIDTH: 1500 mm  
 PLINTH HEIGHT: 500 mm  
 BASE WIDTH (x): 6000 mm  
 BASE LENGTH (y): 6000 mm  
 BASE HEIGHT: 1500 mm  
 BASE EMBEDMENT: 1750 mm  
 OFFSET (x): 0 mm  
 OFFSET (y): 0 mm

• Foundation FAILS under the following conditions:

LOAD CASE 01: 1.2 G + Wu

WIND	BASE Mx*	BASE My*	BASE Vx*	BASE Vy*	ex	ey	qa,max*	AREA	BEARING	SLIDING	OVERTURNING
SE	-1848.60 kN-m	1845.78 kN-m	-87.20 kN	87.20 kN	-1005 mm	1004 mm	112 kPa	80.74%	[112.00%]	[23.71%]	[33.52%]

LOAD CASE 02: 0.9 G + Wu

WIND	BASE Mx*	BASE My*	BASE Vx*	BASE Vy*	ex	ey	qa,max*	AREA	BEARING	SLIDING	OVERTURNING
SE	-1841.55 kN-m	1839.44 kN-m	-87.20 kN	87.20 kN	-1336 mm	1334 mm	123 kPa	61.15%	[123.00%]	[31.62%]	[44.52%]

MINIMUM REINFORCEMENT (AS 3600)

CONCRETE STRESS ( $f'_c$ ): 32 MPa  
 REINFORCEMENT STRESS ( $f_{sy}$ ): 500 MPa

• Minimum required reinforcement ( $A_s$ ) is 1429 mm<sup>2</sup>/m as per AS 3600 Section 16.3.1.

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