

TECHNICAL CODE

INSTALLATION OF COMMUNICATIONS NETWORK FACILITIES ON STREET FURNITURE

DRAFT FOR PUBLIC COMMENT

Developed by



Registered by



Registered date:

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Development of technical codes

The Communications and Multimedia Act 1998 ('the Act') provides for Technical Standards Forum designated under section 184 of the Act or the Malaysian Communications and Multimedia Commission ('the Commission') to prepare a technical code. The technical code prepared pursuant to section 185 of the Act shall consist of, at least, the requirement for network interoperability and the promotion of safety of network facilities.

Section 96 of the Act also provides for the Commission to determine a technical code in accordance with section 55 of the Act if the technical code is not developed under an applicable provision of the Act and it is unlikely to be developed by the Technical Standards Forum within a reasonable time.

In exercise of the power conferred by section 184 of the Act, the Commission has designated the Malaysian Technical Standards Forum Bhd ('MTSFB') as a Technical Standards Forum which is obligated, among others, to prepare the technical code under section 185 of the Act.

A technical code prepared in accordance with section 185 shall not be effective until it is registered by the Commission pursuant to section 95 of the Act.

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Committee representation

The technical code is developed by the Radiocommunications Network Facilities (External) Sub-Working Group (RNF-Ex SWG) under the Malaysian Technical Standards Forum Bhd (MTSFB), constituted by representatives from the following organizations:

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Majlis Bandaraya Melaka Berserajah
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Majlis Perbandaran Sepang
Majlis Perbandaran Seremban
Malaysia Digital Economy Corporation
Maxis Bhd
MEASAT Broadcast Network Systems
Perbadanan Putrajaya
Redsun Engineering Sdn Bhd
Telekom Malaysia Bhd
TIME dotCom Berhad
U Mobile Sdn Bhd
webe digital sdn bhd
YTL Communications Sdn Bhd
Zettabits Technologies

Foreword

This technical code for the Installation of Communications Network Facilities on Street Furniture ('this Technical Code') was developed pursuant to section 185 of the Act 588 by the Malaysian Technical Standards Forum Bhd (MTSFB) via its Radiocommunications Network Facilities (External) Sub-Working Group (RNF-Ex SWG).

This Technical Code provides requirements for installation of communication network facilities on new, existing, and replacement of the street furniture.

This Technical Code shall continue to be valid and effective until reviewed or cancelled.

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INSTALLATION OF COMMUNICATIONS NETWORK FACILITIES ON STREET FURNITURE

0. Introduction

Communication systems play a vital role in daily life and have become a social obligation to the people in helping to generate the economy of the country and state. The digital revolution could become one of the criteria in contributing to the growth of the Gross Domestic Product (GDP), which is derived by digital products and to ensure all government aspirations are fulfilled.

This street furniture guideline is required to enhance the network coverage and capacity at street level, and in preparation for any future technologies.

The integration of street furniture with communication network facilities may address issues such as non-uniformity in design, cost efficiency and deployment speed.

1. Scope

This Technical Code specifies requirements for installation of communications network facilities on new, existing, or replacement of street furniture.

This Technical Code:

- a) outlines the design concepts used in construction of street furniture which include structural, mechanical, and electrical works.
- b) describes the safety requirements at the site during and after installation.

2. Normative references

The following normative references are indispensable for the application of this Technical Code. For dated reference, only the edition cited applies. For undated references, the latest edition of the normative reference (including any amendments) applies.

See Annex A

3. Abbreviations

For the purposes of this Technical Code, the following abbreviations apply.

CME	Civil, Mechanical and Electrical
GDP	Gross Domestic Product
MICC	Mineral-Insulated Copper-clad Cable
PVC	Permanent Virtual Circuit
RCCB	Residual Current Circuit Breaker
WiFi	Wireless Fidelity
AMS	Antenna Mounting Structure
RoW	Right of Way

4. Terms and definitions

For the purposes of this document, the terms and definitions apply.

4.1 Street Furniture

Any new or existing objects in public spaces such as street lamp post, flood light, overhead bridge, gantry street signage and any objects along the road, built and owned by the State, local authorities or private entities, which can be integrated with the communication network facilities

4.2 Gap filler

A small area whereby radio network coverage is poor or where radio network capacity is congested

4.3 Macro site

A communication network site providing a larger network coverage area, typically consists of larger equipment footprint and transmits at a higher output power

4.4 Communication network facilities

Any equipment used for the provisioning of network services by an operator

4.5 Installer

The party who is responsible for the installation of communication network facilities equipment on-site

4.6 Operator

A network service provider who owns or control access to radio spectrum licenses and provides communication services to public

4.7 Auto-reclosure

A type of circuit breaker equipped with a mechanism to automatically close the breaker after it has been opened due to a fault

4.8 Contractor

An entity who undertakes a contract to provide materials or services at a mutually agreed specification, price and timeline

4.9 Purchaser

An entity that contracts a contractor for materials or services at a mutually agreed specification, price and timeline

5. General Requirement

This section details the generic design requirements for the deployment of mobile network designed to provide street level coverage or "gap filler" for capacity and/or coverage for blind spot that is not able to be addressed by conventional macro sites such as tower, monopole, lamp pole or rooftop sites.

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The communication network facilities on the street furniture shall co-exist with existing macro sites and it's not meant to replace the macro sites.

Continuous demands towards better experience of the communications have brought the installation of communication network facilities on street furniture into the market, with its main objective to resolve capacity and blind spot issues.

With the above objective in mind, installation of communication network facilities on street furniture are expected to be in an area where typical structure for macro sites are hard to build, such as by the roadside and public spaces in urban areas. The installation of the communication network facilities on street furniture should blend into its environment.

Existing street furniture structure can be replaced with new street furniture structure if the installation of new communication network facilities does not meet the loading safety factor requirements and the design of the existing street furniture. The installation of the new street furniture is subjected to approvals by relevant authorities.

This installation of communications network facilities on street furniture shall comply with existing relevant Malaysian laws and regulations.

5.1 Civil, Mechanical and Electrical (CME)

The installation of the communications network facilities on the street furniture require specific requirements to be followed. The installation of communications network facilities on existing or replacement street poles shall follow the requirement stipulated in Table 1 while installation of communications network facilities on existing street furniture (other than street pole) shall follow the requirement stipulated in Table 2 below.

a) Installation of communications network facilities on street lighting pole

Table 1. Dimensions of Telecommunication base station cabinet equipment and the street lighting pole

Coverage Type	Street Furniture Type	Area Size for Telecommunication Cabinet	Height of Pole	Diameter Size of Pole
Macro	A1: Street Lighting Pole with communication cabinet on ground	(H x W x D) 2000 mm x 1800 mm x 1300 mm	From 15 m to 18 m	Top Section: 180 mm Bottom Section: 500 mm
Micro	A2: Street Lighting Pole with communication cabinet mounted on pole	(H x W x D) 700 x 350 x 600 mm	From 15 m to 18 m	Top Section: 180 mm Bottom Section: 380 mm
Micro	A3: Street Lighting Pole with communication cabinet inside the pole	(H x W x D) 0 mm x 0 mm x 0 mm	From 15 m to 18 m	Top Section: 180 mm Bottom Section: 450 mm

- b) Installation of communications network facilities on existing street furniture (other than street pole)

Table 2. Dimensions of Telecommunication base station equipment on existing street furniture (other than street lighting pole)

Coverage Type	Street Furniture Type	Area Size for Telecommunication Cabinet	Antenna Size	Cable
Micro	Road signage, overhead gantry pole, flood light, traffic light or pedestrian flyover	(H x W x D) 700 mm x 350 mm x 600 mm Applicable for mounted cabinet only	Sectorized antenna size less than 1200 mm	All cables to install and conceal with proper type of material
	Bus and Taxi Stop	Requirement depends on demands and necessity		
	Pocket Land	Requirement depends on demands and necessity		

5.1.1 Design codes

All designs, materials and workmanship shall, wherever relevant, comply with and be tested to the requirement of the latest editions of the standards listed below together with all the current amendments unless otherwise stated.

- a) BS 499-1, *Welding Standard*
- b) BS EN ISO 1461, *Hot dip Galvanizing Standard*
- c) BS 2901, *Filler Rods and Wires for Gas-shielded Arc Welding Standard*
- d) BS 3692, *Hexagon Bolts Standard*
- e) BS 4360, *Weldable Structure Steel Standard*
- f) BS 5135, *Welding Inspection Standard*
- g) BS 5950, *Structural Steelwork Standard*
- h) BS EN 1993-3-1, *Design of Steel Structure Standard*
- i) BS 4592-2, *Industrial Type Flooring Standard*
- j) BS 5493, *Protective Coating of Iron and Steel Structure Standard*
- k) ASCE Manual 72, *Design of Steel Pole Transmission Structures*
- l) TIA/EIA-222-G, *Design of Steel Transmission Pole Structure Standard*
- m) AS 3995, *Design of Steel Lattice Towers and Masts Standard*

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5.1.2 Basic design wind speeds

The street furniture shall be designed, for the purpose of assessing its structural strength to a basic design wind speed of 33.33 m/s (120 km/h), 3 second gust speed or 22.22 m/s mean hourly wind speed for all sites. This corresponds to a return period of 1 in 50 years. For the purpose of compliance check for maximum deflection (sway) and twist of the street furniture, 1 in 20 years return period wind speed of 30 m/s (3 second gust) or 20 m/s mean hourly wind speed shall be used.

5.1.3 Design Load

The street furniture shall be designed with specific design load so that no failure or permanent distortion will occur on any part of the structures during simultaneous application of the loads. The specified loading configurations are shown in Table 3.

The height of the street furniture shall be 18 m maximum. The maximum height of street furniture may differ from one area to another. Therefore, all installer/operator shall consult on this matter with local council of the area prior to any installation.

Table 3. Specified loading configuration

Loading Type	Numbers of equipment
Solid Parabolic without radome size 0.3	2
2.10 H x 0.5 W x 0.21 D flat antenna	3
0.36 dia x 1.8 H cluster antenna + 0.37 dia x 0.32 H pedestal	1
0.77 H x 0.17 W x 0.15 D small cell	3
Remote Radio Unit	3

The RF feeder cable/Tx cable arrangements as in Table 4 shall also be used.

Table 4. Cable arrangements

Type	Quantity	Dimension (inch)	Weight (kg/m)
0.5 inch RF feeder	maximum 12	12.5	0.5
TX Cable	2	11	0.3
UTP Cable	2	2	0.01
Fibre Cable	6	6	0.01
Power Cable	6	35	1

These antenna elements and all related cables shall be arranged in such a manner that the resulting bending moment and shear forces are the greatest, and that the deflection under the relevant design wind speed shall be maximum irrespective of the direction of antenna and/or the direction of incident wind and shall not be limited to any pattern or direction of antenna arrangement.

5.1.4 Galvanising

The galvanising coating shall be according to at least 610 g of zinc per square meter of surface and shall not be less than 0.086 mm (86 microns) thick and shall be able to withstand the test set out in BS EN ISO 1461.

5.1.5 Bolts and nuts

All connection bolts, nuts and spring washers that are to be used for member connections which shall conform to BS 3692. All bolts and nuts heads shall be in hexagonal shape.

Bolt holes shall not be more than 1.5 mm larger in diameter than the corresponding bolt diameter and free from burrs. The tolerance for location of centres of bolt holes shall be ± 2 mm.

All connection bolts and anchor bolts shall be galvanised including the threaded portion. All nuts shall be galvanised with the exception of the threads, which shall be oiled.

When in position, each connection bolt shall project through its nut for at least a full turn but not exceeding 10 mm.

Each connection bolt shall be supplied as a set, complete with one nut, one spring washer and one flat washer.

Nuts shall be finger tight on the bolt and will be rejected if they are, in the opinion of the telco, considered to have excessively tight or loose fit.

The minimum distance from the centre of the bolt holes to a rolled edge shall be 1.25 x bolt diameter. The minimum distance between holes for multi-bolted joints shall be 3 x bolt diameter. The minimum distance from the centre of the bolt holes to a sheared edge shall be 1.5 x bolt diameter.

5.1.6 Erection marking

All members shall be marked with distinguishing numbers and alphabets corresponding to the erection drawings or bill of materials. The erection marks shall be done before galvanising and shall be clearly legible afterwards.

The erection marks shall be at least 12 mm high, clearly legible and shall be stamped at easily locatable positions.

5.1.7 Materials

All designs shall be such that no trouble shall arise in service from vibration or excessive deflection due to the use of a very light section.

Rolled steel sections, flats, plates, bolts, nuts and bars shall, unless otherwise approved be of steel in accordance to BS 4360 or its latest equivalent British Standards Grade 43A and/or Grade 50C and shall be manufactured and rolled in approved mills.

Steel shall be cleaned and free from blisters, rust and scale or other defects before hot dipping process. Minimum thickness of structural members (angle sections) shall be 5 mm. The ultimate design stresses in tensile members shall not exceed the elastic limit strength of the material, whereas the ultimate stresses in the compression members shall not exceed a figure calculated from an approved formula.

5.1.8 Deflection limit

The maximum twist and sway (deflection) at any specified elevation of the fully loaded street furniture (inclusive of all the designed antennae, accessories and radio feeders) shall not exceed 0.5 degree at a 1:20 year return period wind speed of 30 m/s 3 second gust or 20 m/s mean hourly wind speed. The gustiness of wind loading shall be included in the deflection assessment. A wind speed partial safety of 1.0 may be used.

5.1.9 Fabrication tolerances

The length of a member shall not deviate from its specified length by more than ± 3 mm. Straightness of a member shall not exceed 3 mm for all non-hollow sections and 2.5 mm for all other sections.

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5.1.10 Loading configurations - Ancillary loadings

The street furniture shall be designed to carry parabolic microwave dishes, flat panel antenna, cluster antenna and RF and Tx cables of various combinations. For the purpose of design, it shall not exceed the parameters as shown in Table 5.

Table 5. Design parameters

Loading type	Weight per unit (kg)	Wind resistance area (m ²)
Solid Parabolic without radome 0.3	15	0.28
2.10 H x 0.5 W x 0.21 D flat antenna	60	1.05
0.36 dia x 1.8 H cluster antenna + 0.37 dia x 0.32 H pedestal	84	0.72
0.77 H x 0.17 W x 0.15 D small cell	17	0.13
Remote Radio Unit	30	0.32

5.1.11 Design criteria and codes

The summary of requirements can be referred as in Table 6.

Table 6. Design criteria and codes

No.	Items	Descriptions
1.	Type of structure	Mild steel polygonal street furniture pole.
2.	Height of structure	Maximum 18 m
3.	Design wind speed	a) 33.33 m/s (120 km/h) 3 second gust wind speed or 22.22 m/s mean hourly wind speed. b) 30 m/s 3 second gust or 20 m/s mean hourly wind speed for the purpose of deflection compliance check.
4.	Partial safety factors in design	Appropriate factors correspond to the quality and importance of the street furniture pole shall be obtained from BS 8100 series. A minimum material factor of 1.10 (corresponds to Class A quality) and a minimum wind speed factor of 1.20 (corresponds to site near to main trunk road and railway or any other major public utilities such as reservoir, power transmission lines, residential housing etc) shall be adopted. The definition of near shall mean the radial coverage of the height of the pole plus a buffer of 10 m.
5.	Terrain category	In the derivation of wind loadings, a terrain category of 3 in accordance with BS 8100 or within town area in accordance with BS 6399: Part 2 shall be used for general design submission. In any particular application of the street furniture structure, the relevant terrain characteristic of the particular site shall be used and fresh calculations shall be submitted.
6.	Wind loading code	Wind loads may be derived using BS 6399: Part 2 or BS 8100: Part 1. BS 6399: Part 2 may be used if detailed derivation in accordance with

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No.	Items	Descriptions
		<p>Annex C of the Code, that factor K_b, building type factor, and the resulting dynamic augmentation factor, C_r, falls within the Code applicability limit of 0.25. Otherwise, BS 8100 shall be used.</p> <p>CP3: Chapter V: Part 2 shall not be used as it had been superseded by BS 6399: Part 2.</p>
7.	Analysis and derivation of design forces	<p>Equivalent static method of analysis may be used. Appropriate wind gust factors and force coefficients for antenna, branches and poles and ancillaries shall be taken into account in deriving the design wind loading.</p> <p>For cases whereby the natural frequency of the street furniture (calculated using established software, with due consideration of weight and disposition of platform and antenna away from the pole structure centre-line) being less than 2 Hz, dynamic analysis using spectral analysis or time history analysis shall be carried out to assess the pole response to wind excitation. In this regard, all mode shapes below 2 Hz shall be assessed.</p> <p>The more critical resulting forces derived from equivalent static method and dynamic method shall be use for detailed design.</p>
8.	Analysis and design of pole foundation	<p>Footing foundation shall be used when the subsoil conditions within a depth of twice the maximum base dimension is capable to provide a safe bearing capacity of 100 kN/m². Otherwise piled foundation shall be used. There shall be no soil tension being developed at the base of the footing.</p> <p>The minimum factor of safety for overturning under un-factored design wind speed of 33.33 m/s 3 second wind gust or 22.22 m/s mean hourly wind speed shall be at least 2 without wind gust effect and 1.5 when wind gust is included. A safety factor 1.05 shall be used if factored wind speed is used with full wind gust effects applied.</p> <p>The rotational characteristic of footing onto the pole shall be taken into account when assessing the deflection limit of the pole. A sub grade reaction of 12 000 kN/m³ may be used for this purpose.</p> <p>In no case shall tension be allowed in any piles when a piled foundation is used.</p>
9.	Load configuration	<p>1 nos. 0.3 m diameters parabolic dish and 3 nos. of flat panel or 1 no of cluster antenna</p> <p>These shall be positioned such that maximum wind resistance is achieved.</p>

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No.	Items	Descriptions
10.	Cable configuration	12 nos. of 1/2" RF feeder cable stacked in 1 row and 2 nos. of 1/4" Tx cable. All cables are to be placed inside the street furniture pole. Cable guides are to be installed inside the street furniture pole.
11.	Design codes	a) Street furniture structure - BS 5950 b) Tower foundation - BS 8110.
12.	Material codes	a) Steel works - BS 4360. b) Galvanising - BS EN ISO 1461. c) Bolts and nuts - BS 4190, BS 3692 and BS 4320. d) Welding - BS 5135.
13.	Material strengths	All structural steel used are to be as follows: a) grade 43 with a yield strength, $f_y = 275$ N/mm ² ; b) grade 50 with a yield strength, $f_y = 355$ N/mm ² ; and c) welded sections: maximum ultimate weld strength of 215 N/mm ² may be used. Grade 55 with a yield strength, $f_y = 450$ N/mm ² shall not be used when pole sections were being make up of welded pieces unless fatigue analysis in accordance with BS 8100 is carried out. All structural bolts used are to be of grade 8.8 with the following properties: a) yield strength $f_y = 627$ N/mm ² ; and b) shear strength $P_s = 375$ N/mm ² .
14.	Physical characteristics	Maximum tilt of the top of the structure is not to exceed 0.5° from centre under a design wind speed of 30 m/s 3 second gust wind speed or 20 m/s mean hourly wind speed, which corresponds to 1:20 years return period. Wind gust effects shall be included in the analysis for deflection compliance.
15.	Diameter of bottom section	Maximum 500 mm.
16.	Equipment Cabinet Dimension	Maximum 2000mm L x 1300mm W x 1800mm H on ground or 700mm x 350mm x 600mm cabinet attached to the street furniture

5.1.12 Site compound

Site compound of street furniture incorporates attributes required for fast and affordable deployment while at same time blending the pole or equipment cabinets into its surrounding environment. In general, no fencing is required for street furniture and its equipment cabinets, similarly typical roadside cabinets.

5.1.13 Earthing and lightning protection

Earth continuity conductors and earth leads shall be of high-conductivity copper, continuous throughout their whole lengths and without joints, except by means of approved mechanical clamps. Where connections are made at switchgear and such items of electrical equipment, the conductors shall terminate in soldered or compression-type sockets.

In the case of Mineral-Insulated Copper-clad Cable (MICC)/Permanent Virtual Circuit (PVC) cables, the copper outer sheaths of the cables may be utilised as earth continuity conductors, provided that at the termination of each cable-run the copper sheaths (or sheaths in the case of single-core, multiple runs of MICC/PVC cables) shall be effectively bonded to earth.

Every circuit of a switchboard, distribution board, control board, tap-off unit and splitter switch-fuse unit shall be provided with its own earth-continuity conductor. All earth-continuity conductor shall be connected to a single earth bar before connected to the external earthing network as recommended by ITU in ITU-T K.27, *Bonding configurations and earthing inside a telecommunication building* and ITU-T K.56, *Protection of radio base stations against lightning discharges*.

Performance of earthing system is considered acceptable when the following conditions are met:

- a) On electrical safety, Residual Current Circuit Breaker (RCCB) should trip within 200 ms of test at the RCCB leakage rating. The functionality of RCCB should be verified by RCCB tester in accordance to the Suruhanjaya Tenaga (ST) requirement.
- b) To achieve earthing resistance of 10 ohms is expected, on a best effort basis which there should be a minimum of 3 earth points (using earth rods) to a maximum of 5 earth points at each site.

For earth electrode system, electrodes shall comprise 16 mm diameter, 1.6 m long, extensible-type, copper-steel-cored rods ("Copper weld" or approved equivalent make), driven into the ground at interval of at least twice the driven length of any two electrodes. Electrodes shall be driven into ground by means of a "KANGO" or similar type electric or pneumatic hammer. Every connection clamp shall be provided with regulation-type concrete inspection chamber and cover.

The minimum number of electrodes installed for each earthing point shall be 3 and the minimum length of each electrode shall be 1.6 m. The numbers of earthing points indicated in the drawings are indicative only and shall in no way imply that the earthing points are sufficient to obtain the value of 1 Ω .

The contractor shall increase the driven length or number of earth electrodes and if necessary, non-soluble earth enhancing compound be considered to obtain the required earth resistance, subject to the approval of service providers. In exceptionally bad areas, the contractor shall propose the use of extra copper earth grids and earth enhancing compound to achieve the desired earth resistance value

A lightning protection air termination or lightning rod shall be fitted to the top of each street furniture. As long as the structure is located nearby/surrounding buildings which have its own/sufficient lightning protection system, it might not be necessary/compulsory for the said structure to install its own lightning protection system.

5.1.14 Electrical Requirement

Maximum requirement for permanent power supply is 3 phase 60A 415V with solution to tap from the existing power supply available or new application from the power supply provider.

Auto-reclosure can be optionally used together with RCCB to avoid nuisance tripping.

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5.2 Aesthetic

Under special circumstances, some radio stations (especially the radio antennas and microwave dishes) are required to blend in with its surrounding or to be aesthetically pleasing to the sight. This is achieved through various means of treating the main structures inside the station such as the Antenna Mounting Structure (AMS) and/or the equipment enclosure to make them inconspicuous.

The requirements for aesthetic installation, wherever relevant, shall comply with the specification listed in MTSFB 001, *Technical Standards and Infrastructure Requirements: Radiocommunications Network Infrastructure (External)*.

5.3 Right of Way (RoW)

The legal rights, established by usage or grant, to pass along a specific route through ground or property belonging to authorities.

Local authorities should provide a network facilities provider with non-discriminatory access to any street furniture, network facilities or right of way owned by the authorities upon request by network facilities.

A network facilities provider or authorities may deny any network facilities provider access to the street furniture, network facilities or right-of-way on a non-discriminatory basis where there is insufficient capacity, or for reason of safety, security, reliability or difficulty of a technical or engineering nature.

6. Technical Requirement

6.1 Communication network facilities

Communication network facilities will be installed at any new, existing or replacement of street furniture with the maximum numbers of equipment and housing size as below.

6.1.1 Equipment

The maximum allowable number of equipment installed shall be in accordance to Table 7 below:

Table 7. Number of equipment

Equipment Descriptions	Numbers of equipment
Solid Parabolic without radome 0.3	2
2.10 H x 0.5 W x 0.21 D flat antenna	3
0.36 diameter x 1.8 H cluster antenna + 0.37 dia x 0.32 H pedestal	1
0.77 H x 0.17 W x 0.15 D small cell	3
Remote Radio Unit	3

6.1.2 Housing

The maximum allowable dimension of the housing shall be in accordance to Table 8 below:

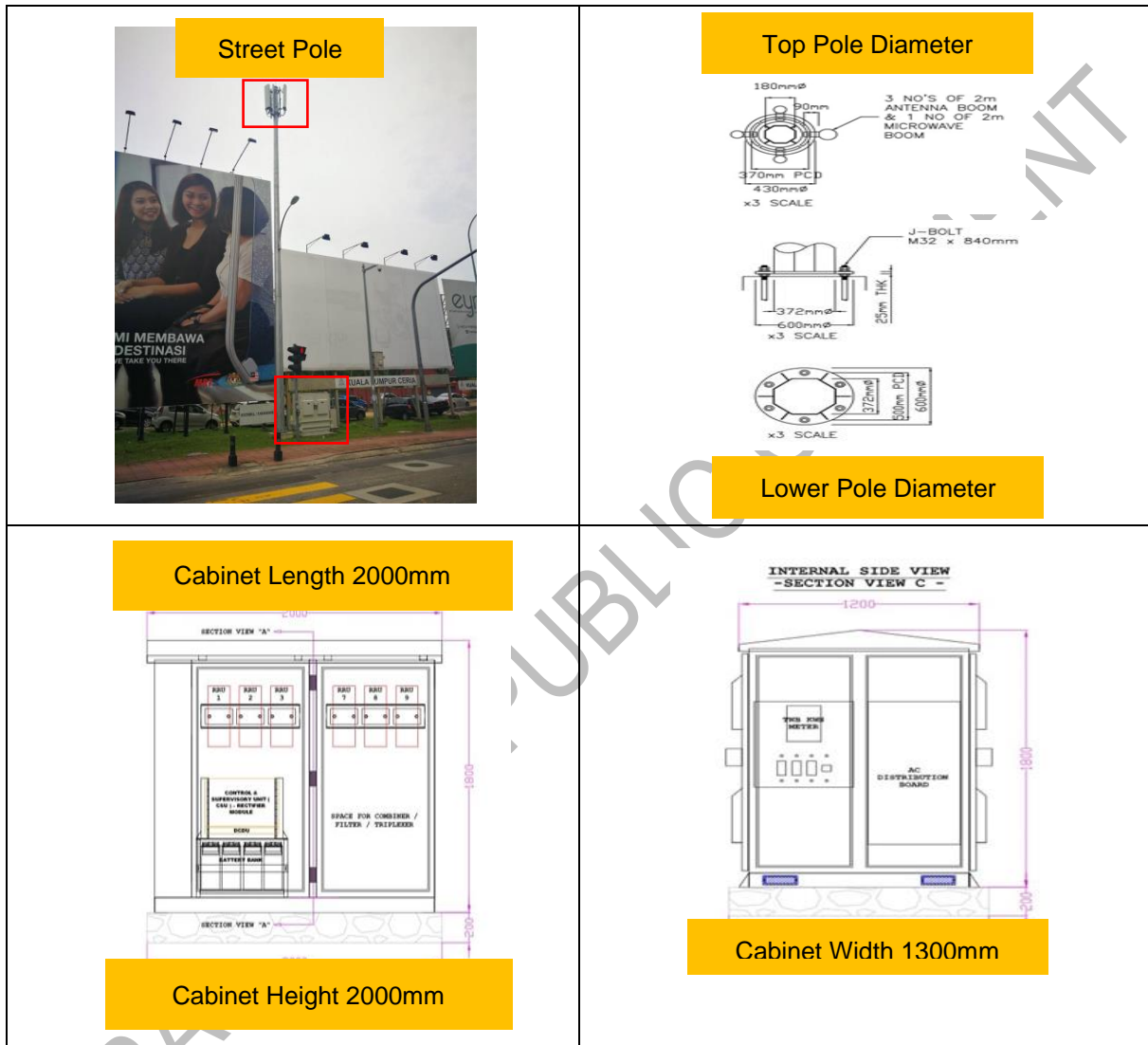
Table 8. Housing Dimension

Items	Descriptions
Equipment Cabinet Dimension	Maximum 2000mm L x 1300mm W x 1800mm H on ground or 700mm x 350mm x 600mm cabinet attached to the street furniture

6.1.3 Installation

There are few installation types of communication network facilities on the street furniture. The types of installation are as follow:

a) Installation on Street Lighting Pole Type A1



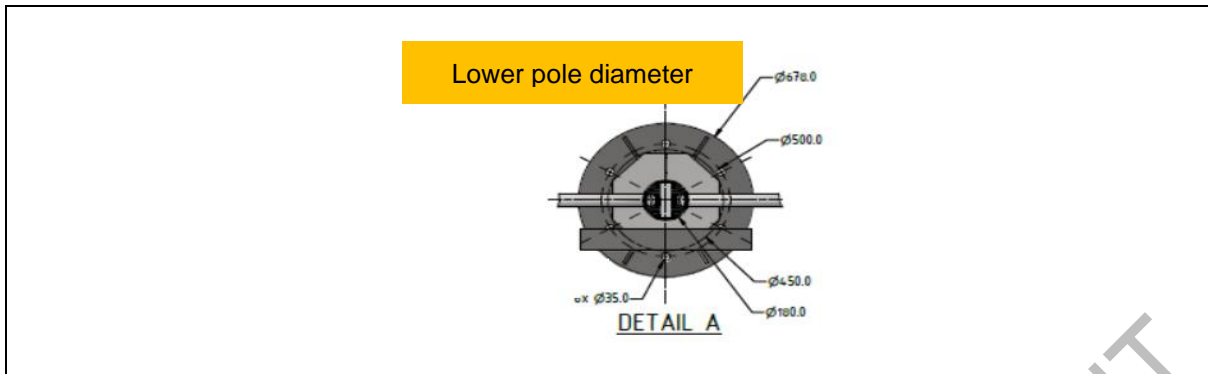
b) Installation on Street Lighting Pole Type A2

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<p>Existing / New</p> <p>Small cell antenna</p> <p>Equipment cabinet</p>	<p>Pole Height 18 m</p>
<p>Antenna Size</p> <p>Fiber MXU Box</p>	<p>Cabinet Size</p>

c) Installation on Street Lighting Pole Type A3

<p>Pole height</p> <p>Equipment</p>	<p>Top pole diameter 180 mm</p> <p>DETAIL B</p>
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d) Installation on Street Road Signage and Gantry



e) Installation on Street Signboard and Bus Stop



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6.2 Backhaul

Transmission backhaul is inclusive of microwave transmission, fixed line fiber or any other wireless backhaul medium.

6.3 Operation and maintenance

Maintenance of the communication network facilities shall be remained under the responsibility of the operator. Regular site inspection is required by the street furniture owner to ensure the street furniture is structurally sound. This is a preventive maintenance where any deterioration can be highlighted ahead of time and corrective work be done to prevent further degradation to the structure. Failure to observe a regular maintenance schedule can create a potentially hazardous working and operating conditions.

6.3.1 Site access

It is important to ensure that there is 24 hours access availability to the station. However, for highly sensitive area for example 'Sasaran Penting Kerajaan', prior approval shall be obtained for site access. Site access should be made available:

- a) during office hours; and
- b) as and when required at the event of emergency.

Any arrangement on the site access should be commercially agreed by both parties as spelled out in the Commission Determination on the Mandatory Standard on Access (Determination No.3 of 2016). The service provider's employees, contractor, vendor and/or agent are responsible to ensure that access members do not violate any service provider's policies, do not perform illegal activities, and do not use the access to property for outside business interests. The service provider's employee(s), contractor, vendor and/or agent bear responsibility for the consequences should the access be misused.

For any other access permission request that the service provider's employees, contractors, vendors and/or agents may deem would lead to the violation of access given, the service provider's employees, contractors, vendors and/or agents shall directly refer to the relevant authorised department or personnel(s) of the service provider for further verification.

Site access shall be strictly controlled. Control will be enforced via the following identification or authentication verification and log record:

- a) the service provider's employee identification document or pass card;
- b) authorisation letter; or
- c) authorised work permit.

Service provider's employee shall not provide their access identification document or pass card, access key and/or access password to anyone, not even service provider's members.

Any personnel(s) that have accessed to the property shall strictly follow the code of conduct as may be outlined while on the property premises.

6.3.2 Maintenance activities

This section seeks to establish procedures and guidelines for the inspection and maintenance of street furniture. It also identifies the deficiencies, the defective items and recommends solutions to keep the structure in good condition and optimum performance.

Structure owner to adhere to maintenance obligations stipulated in paragraph 5.12 of Commission Determination on the Mandatory Standard on Access (Determination No. 3 of 2016).

Conditional exemptions can be applied to any unscheduled corrective maintenance in the event of emergency scenario, subject to informing local authority followed by a submission thereafter.

6.4 Safety and Security

The contractor shall be responsible and held accountable for all safety and health issues in and around the Site.

The contractor shall ensure compliance by its employees, servants, agents and sub-contractors with all applicable laws, provisions, regulations, ordinances, standards and codes of practice now or later in force relating to safety and health, which includes without limitation, the Occupational Safety and Health Act 1994 ("OSHA") and the Factory & Machinery Act 1967 ("FMA"). The contractor shall at all times be responsible for ensuring that its employees, servants, agents and sub-contractors perform their duties in a safe, orderly, clean manner and manage safety and health in compliance with the OSHA and FMA and other relevant legal provisions, laws and regulations in force.

The contractor shall provide the purchaser with 1 copy of its written Safety and Health policy/manual and program prior to commencement of the contract.

The contractor shall at its own expense ensure that all personnel provided in the performance of the works are fully trained, qualified, competent and properly certified in all safety and health aspects. Such training, qualification, competency and/or certification will be provided by the contractor or relevant authorities or bodies under the applicable laws, rules, and regulations, directive of any government body or as required by the purchaser.

The contractor shall ensure that all equipment, machinery, plant, tools, facilities and other items used by the contractor, its employees, servants, agents and subcontractors in the execution of the works shall be at all times of safe, sound, good and working condition, safely and competently operated. The contractor shall at its own expense provide the necessary safety equipment, personnel protective equipment and clothing, footwear, hard hats and such other appliances as may be necessary or required by law or regulation for the proper and safe execution of the works.

The contractor and its subcontractors shall give access to authorized representatives of the Department of Occupational Safety and Health or any state or local official for the purpose of inspecting or investigating or carrying out any duties under the OSHA or under any state or local act affecting safety and health.

The contractor shall be responsible for any violation or breach of any safety or health standards, regulation or law on Site or relating to the works and shall at its own expense immediately remedy any condition giving rise to such violation or breach. The refusal or inability of the contractor to remedy such violation or breach immediately or within the stated agreed period with the purchaser shall constitute a breach of contract and the purchaser may, in addition to and without prejudice to any other rights, suspend or terminate the contract accordingly.

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All information and details relating to any accident or incident will be recorded in the site diary and the contractor shall inform the purchaser immediately and further in writing of the accident/incident within 24 hours of its occurrence. For accidents/incidents reportable to statutory bodies, the contractor shall with prior consultation with the purchaser report the accident/incident to the relevant authorities.

Annex A
(normative)

Normative references

MTSFB 001, *Technical Standards and Infrastructure Requirements: Radiocommunications Network Infrastructure (External)*.

ITU-T K.27, *Bonding configurations and earthing inside a telecommunication building*

ITU-T K.56, *Protection of radio base stations against lightning discharges*.

BS 499-1, *Welding Standard*

BS 2901, *Filler Rods and Wires for Gas-shielded Arc Welding Standard*

BS 3692, *Hexagon Bolts Standard*

BS 4360, *Weldable Structure Steel Standard*

BS 4592-2, *Industrial Type Flooring Standard*

BS 5135, *Welding Inspection Standard*

BS 5950, *Structural Steelwork Standard*

BS 5493, *Protective Coating of Iron and Steel Structure Standard*

BS 8100 (All Parts), *Lattice towers and masts*

BS EN ISO 1461, *Hot dip Galvanizing Standard*

BS EN 1993-3-1, *Design of Steel Structure Standard*

ASCE Manual 72, *Design of Steel Transmission Pole Structures*

TIA/EIA-222-G, *Design of Steel Transmission Pole Structure Standard*

AS 3995, *Design of Steel Lattice Towers and Masts Standard*

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- [1] *The Role of Street Furniture in Expanding Mobile Broadband*, Wireless Infrastructure Association

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