Raycap

SMALL CELL CONCEALMENT

PRODUCT GUIDE

TABLE OF CONTENTS

Company ..... 4 - 9
- About Raycap 6
- North American Facilities & Capabilities 7
- Small Cell Concealment Overview ..... 8 - 9

Small Cell Poles ..... 10 - 49
- Small Cell Pole Overview 12
- Basic Poles 13
- Pre-Fab Foundations 14
- Structural Bases 15
- Decorative Bases 18
- Pole Top Shrouds ..... 19 - 21
- Shroud Solutions 24
- Cable Shrouds/Radio Masks 25
- Light Arms 26
- Mid-Pole Shrouds ..... 27 - 35
- Wood Pole Mounts ..... 36 - 39
- Wood Pole 4G+5G Modular Components ..... 40 - 43
- Wood Pole Extension Mounts 44
- Complete Side-Mounted Solutions 44
- Galvanizing, Powdercoating & Painting 45
- Artist Painting 45
- Laser, Plasma Cutting, Forming & Rolling 46
- Welding & Assembly 47
- Small Cell Pole Photo Gallery 48
- Pole Top Shrouds Photo Gallery 49

Power Management Solutions ..... 50 - 59
- Meterbase 52
- AC Disconnects ..... 53 - 57
- Mounting Pedestals & Meter Socket. 58
- AC/DC Combo Power Management. 59

Fiber Management Solutions ..... 60 - 63
- Fiber Enclosures 62
- Fiber Cabinets 63

Specialized Concealment & Indoor DAS Systems ..... 64 - 69
- Rooftop Solutions ..... 66 - 67
- Wall Mounted Solutions 68
- Wall & Rooftop Solutions Gallery 69

Research & Development ..... 70 - 83
- Standards & Certifications 72
- Testing & Measurement ..... 73 - 81
- InvisiWave® Solutions 82
- Panel & Rooftop Products 83

Services ..... 84 - 89
- Product Design & Integration 86
- Photo Simulations 87
- Thermal Analysis & Active Cooling 88
- Site Visits and Survey & Structural Analysis 89

Appendix ..... 90 - 91

Raycap
Raycap
Raycap
A
C
E
G
I

COMPANY

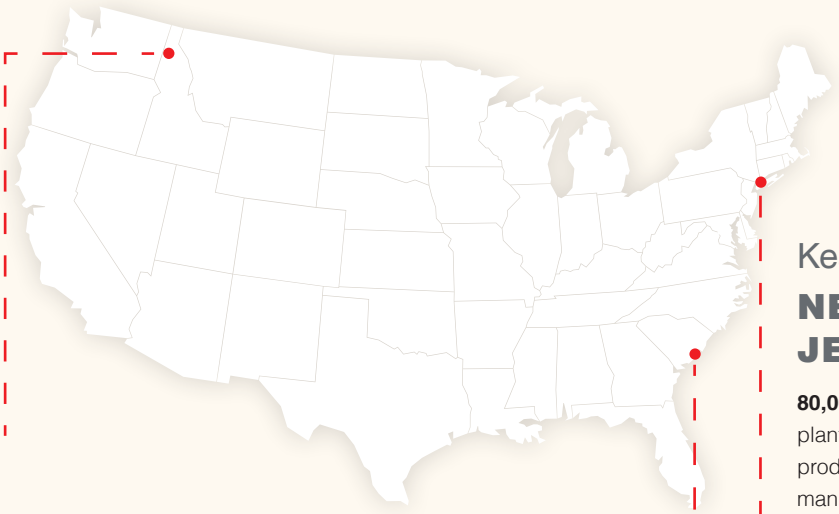
ABOUT RAYCAP

Raycap is a global solutions provider with a clear vision of the future network, a result of many years of research and development in the telecommunications field and our continuous engagement with the leading companies in our industry, including partners, customers, suppliers, current and future stakeholders of the network. We have proven to be a thought-leader in our space, and our edge is in the design of high throughput, high-density, and multi-technology passive solutions. We possess a unique capability to quickly turn concepts and innovative ideas into industrialized, cost-efficient products, providing realistic solutions and support in any network infrastructure.

Twenty-five years ago, the telecommunications landscape was much different than today – cell phones were larger, smartphones were nonexistent, and society was not connected by technology 24 hours a day, seven days a week. Since then, the industry has grown immensely with new equipment and increased demand from mobile operators for more expanded and hardened networks. The latter necessitates the installation of numerous apparatus such as remote radio heads, small cells, antennas, and microwave links located on tower tops, rooftops, and even at street level, which must be concealed.

Raycap has one goal in mind: to provide our customers the best design, R&D, engineering, manufacturing, and sales support to be a one-stop-shop for customers looking to build out their next-generation networks.

NORTH AMERICAN FACILITIES & CAPABILITIES



Post Falls

IDAHO

95,000 square foot plant with engineering, product development, manufacturing, assembly and testing facilities.

Kearny

NEW JERSEY

80,000 square foot plant with engineering, product development, manufacturing, assembly of radio shrouds, antenna mounts, radio concealment light poles, ground furniture and strand mounts.

North Charleston

SOUTH CAROLINA

200,000 total square foot fabrication and integration facilities with full steel and composite fabrication capabilities plus in-house wet paint and powder coat lines.

International Reach With Locations Near You

Raycap acquired STEALTH Concealment in June 2018 and APELIO Innovative Industries in January 2020. Together, these acquisitions form cornerstones of Raycap's wireless infrastructure concealment experience in North America, working with customers to create aesthetically pleasing and RF-friendly solutions. STEALTH Concealment was the wireless concealment industry pioneer, while APELIO Innovative Industries had expertise in designing and manufacturing infrastructure hardware and electrical switchgear.

Today, the Raycap Group designs and manufactures concealment solutions consisting of small cell light poles, toppers, shrouds, mounts and brackets, rooftop screen walls, cupolas, towers, silos, DAS concealments, and many other custom structures for North American small cell and macro cell sites from its US factories on the East Coast in South Carolina and New Jersey; and on the West Coast in Idaho.

SMALL CELL CONCEALMENT OVERVIEW

POLE PRODUCTS

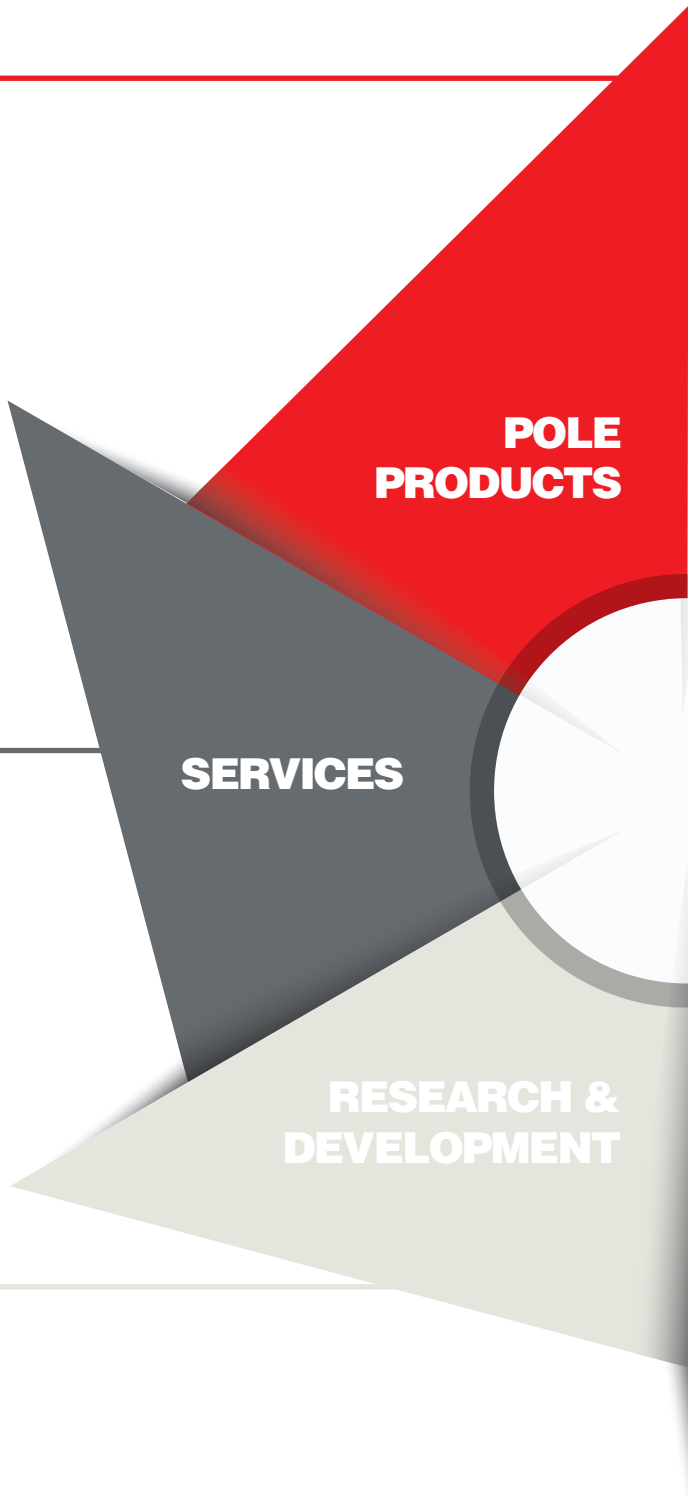
- Poles
- Radomes
- Galvanizing, Powder Coating & Painting
- Pre-Fab Foundations
- Bases
- Cable Shrouds
- Pole Top Shrouds
- Luminaries
- Mid-Pole Shrouds
- Mounts & Brackets

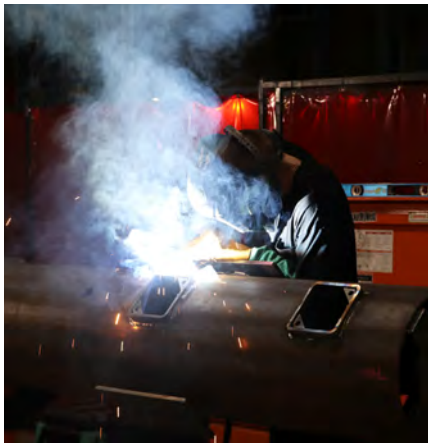
SERVICES

- Site Visits & Surveys
- Structural Analysis
- Product Design
- Integration
- Thermal Analysis
- Smart Active Cooling
- Photo Simulations

RESEARCH & DEVELOPMENT

- Testing & Measurement
- Standards & Certifications
- Electrical Safety
- InvisiWave® Solutions





POWER MANAGEMENT

FIBER MANAGEMENT

SPECIALIZED CONCEALMENT SOLUTIONS

POWER MANAGEMENT

- AC Disconnect Solutions
- AC/DC Combo Power Management
- Meterbases
- Mounting Pedestals

FIBER MANAGEMENT

- Fiber Enclosures
- Fiber Cabinets

SPECIALIZED CONCEALMENT SOLUTIONS

- Rooftop Solutions
- Wall Mounted Solutions
- Indoor DAS Solutions

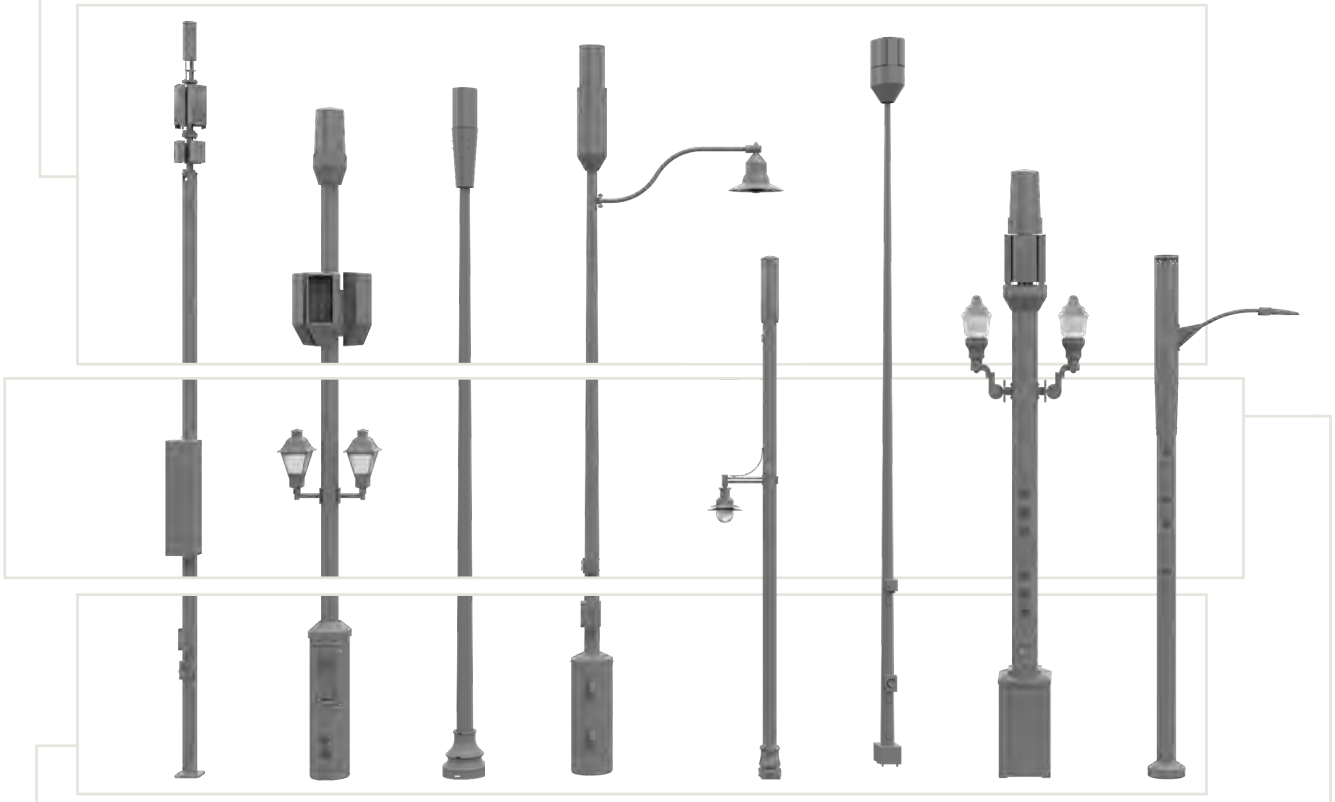
SMALL CELL POLES

SMALL CELL POLE OVERVIEW

Raycap's concealed and non-concealed small cell poles, including pole toppers and mid-pole shrouds, are built to meet exact specifications and maintain maximum RF performance. Designed for flexibility, performance, and aesthetics, the company offers many pole options, including poles with fluting, various bases, pole top or mid-pole equipment shrouds, light arms and luminaries, mounts, and other hardware. In addition, power and fiber connectivity and power management solutions can be included to enable easy integration and provide protection from electrical overvoltages. No matter your rollout needs, Raycap has the right solution for you.

Radio Technology

Small cell poles are designed to customer specifications and delivered fully integrated and concealed, or in any format upon request. Raycap designs can accommodate all radio technologies with many available toppers and shrouds.



Bases

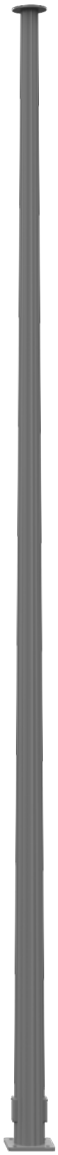
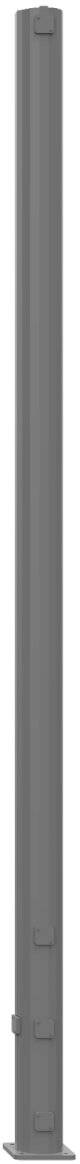
Raycap provides decorative bases to be installed around existing poles to hold and conceal power, fiber distribution, and radio equipment. Structural bases are also available and can support an existing or new light pole installed on top.

Light Arms & Shrouds

Customers can order pole solutions with optional lighting arms, mid-pole shrouds, or attachments to match surrounding light poles. Poles can be designed and engineered to re-use existing luminaires, reducing site costs and lead time.

BASIC POLES

Raycap's base pole options support various diameters and include fluted, round tapered, round straight, and multi-sided.

Round Tapered	Fluted	Octo Fluted	Round Straight	Multi-Sided	Integrated
					

PRE-FAB FOUNDATIONS

Raycap can provide customers with traditional poured-in-place foundation designs, and alternative pre-fabricated foundation options to help expedite deployment.

Pre-fabricated options include:

- Breakaway Pole with Direct Embed
- Breakaway Pole with Helical
- Additional options will require soil backfill, stone backfill and/or concrete backfill
- Note that custom depths and diameters are available to suit any size pole and/or soil conditions

Direct Embed

Helical

STRUCTURAL BASES

Slim Cylindrical

- 18" round pipe x 4' tall
- Structural base, pole bolts on top
- Fans and meter viewing window integrated into door

Cylindrical

- 20" round pipe x 4' tall (pending specific equipment required)
- Structural base, pole bolts on top
- Available in larger pipe diameters and one or two doors
- Pictured with Nola clamshell base (20" pipe only)

Rectangular

- 25" x 25" square x 4' tall
- Structural base, pole bolts on top
- Side panels removable for equipment access

Note: custom sizes available upon request

XL Cylindrical

- 20" round pipe x 8' tall
- Structural base, pole bolts on top
- Robust ventilation system for large quantity of equipment
- Pictured with Nola clamshell base (20" pipe only)

Octagonal

- 36" octagon x 4' tall
- Clamshell base, wraps around wood or steel poles
- Meter viewing window on hinged door

MOVIES
500 N
8th St
St. Louis

st. louis

DECORATIVE BASES

Argenta

- 4'4" tall decorative clamshell base cover
- Accepts poles and round structural bases within 8" - 20"

Dallas

- 3'2" tall decorative clamshell base cover
- Accepts poles and round structural bases within 12" - 18"

Nola

- 12" tall decorative clamshell base cover
- Designed for 18" or 20" round structural bases

Sarasota

- 20" tall decorative clamshell base cover
- 16" base outside diameter (OD) for 8" and 10" poles
- Slim design for tight locations in the public ROW or sidewalks

POLE TOP SHROUDS

RTR-2001164-00

- 24" OD partially concealed topper for Ericsson (E///) 6701
- Standard with downtilt mounts
- Designed for 8" or 10" Raycap steel pole

RTR-2001604-00

- 18" OD fully concealed for Amphenol 4G Omni
- Clamps on top of wood or steel pole of 5" - 9" OD
- 3° of tilt correction

RTR-2000793-00

- 22.5" OD fully concealed for Samsung 5G and 4G Omni
- Slip fits on top of 9" - 10" OD tapered steel pole

REM-2849-2

- 18" fully concealed for Gamma Nu 4G Omni & E/// 2203
- Clamps on top of wood or steel pole from 5" - 10" OD

REM-5651-IW

- 22" OD fully concealed topper for E/// 6701
- Clamps on top of wood or steel pole of 5" - 12" OD
- No down tilt included

POLE TOP SHROUDS

RTR-2100357-00

- Unconcealed 4G wood pole topper
- Galtronics 4G Omni
- Clamps to wood pole 5" - 14" OD

RTR-2100828-00

- Unconcealed JMA 4G Omni topper
- Conceals (2) E/// 220x radios within ventilated cable shroud
- Designed for Raycap steel pole or REM pole clamp mounts

RTR-2101843-00

- 18" Radome for Gamma Nu 4G Omni & E/// 2203
- E/// 2181 5G radio mask combo
- Clamps on top of wood or steel pole of 5" - 14" OD
- Also bolts to top of Raycap steel poles

RTR-2100459-00

- 16" OD partially concealed topper for E/// 6701
- Standard with downtilt mounts
- Designed for Raycap steel pole or REM pole clamp mounts

RTR-2100278-00

- Unconcealed Gamma Nu 4G Omni topper
- Conceals (4) E/// 220x radios within ventilated cable shroud
- Designed for Raycap steel pole or REM pole clamp mounts

RTR-2100325-00

- Unconcealed 4G + 5G topper
- Shown with cable shroud prior to 5G deployment
- Designed for Raycap steel pole or REM pole clamp mounts

RTR-20138-30

- 30" OD radome for (2) Amphenol 4G panel antennas
- Clamps on top of wood or steel pole of 5" - 14" OD
- Also bolts to top of Raycap steel poles

RTR-2489-3

- U18" fully concealed for Gamma Nu 4G Omni & E/// 2203
- Clamps on top of wood or steel pole of 5" - 10" OD
- Includes Raycap RSCAC-1028 cabinet for 4G radios

RTR-2100102-02

- Partially concealed 4G + 5G wood pole topper
- Samsung 5G radios or equivalent
- 4G Omni antenna shown
- Clamps on top of wood or steel pole of 7.5" - 10" OD

REM-8359

- Unconcealed topper with center spine
- Accepts 5G radios or small 4G panel antennas
- Clamps on top of wood or steel pole of 5" - 14" OD

RTR-2100102-01

- Partially concealed 4G + 5G wood pole topper
- Samsung 5G radios or equivalent
- Small 4G panel antennas shown
- Clamps on top of wood or steel pole of 7.5" - 10" OD

NO
TURN
ON
RED
Broad St
For Lease
412.944.2135

NO
TURN
ON
RED
Beaver St

SHROUD SOLUTIONS

RTR-1044-IW

InvisiWave® 5G-READY SOLUTION

- Covers and hides from sight radios attached to poles or other structures without interfering in radio performance
- DoITT-Approved and compliant design to NYC guidelines
- Fabricated from RF friendly material
- Tested from low frequencies up to 100 GHz
- Suitable to concealing mmWave radios
- Features minimum dB loss
- PIM free tested per IEC 62037-8
- Thoroughly tested to validate no beamforming impact
- Hydrophobic surface
- Compatible with multiple radio/antenna configurations (Mounts supplied per customer-specified combinations)
- Multiple color options available
- Easy to install
- Includes 5G radio bracket and antenna mount
- Includes pole mounting brackets
- Fans and controllers included
- Adjustable internal height is configurable to multiple radio/antenna configurations to allow for easy future expansion or equipment swaps

For Samsung RA AU Radios

REM-5470

- Complete solution for Samsung 5G NR AU radios
- Through bolted connection style; alternative connection types available for different pole styles
- Accommodates all small cell 4G canister antennas and Samsung 5G NR AU radios
- Variable pole diameter – Attaches to most common sizes
- All structural steel hot dip galvanized per ASTM A123 with optional powder-coated finish to customer color specification
- Optional RCS-5128 antenna cable shroud for 5G radios*
  - Provides cable concealment and protection
  - Fabrication fit to radio used
- Fabricated from RF friendly, mmWave friendly material
- Tested from low frequencies up to 100 GHz with minimum dB loss
- Thoroughly tested to validate no beamforming impact
- PIM free tested per IEC 62037-8
- Hydrophobic surface
- Easy to install
- Multiple color options available

REM-5470

**RCS-5128*
(optional cable shroud)

CABLE SHROUDS/RADIO MASKS

RCS-8105-01

- InvisiWave 5G mask for Samsung ATK and E/// 6701 radios
- Thermal analysis designed passive ventilation
- Compatible with OEM mounts or Raycap mount sold separately

RCS-21281

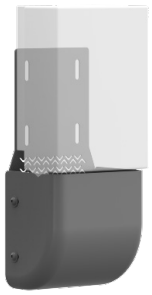
- InvisiWave 5G radio mask for E/// 1281 radio only
- Thermal analysis designed passive ventilation
- Compatible with OEM mounts or Raycap mount sold separately

RCS-21147

- InvisiWave 5G radio mask for Nokia AEUB, Samsung ATK, and E/// 6701 radios
- Thermal analysis designed passive ventilation
- Compatible with OEM mounts or Raycap mount sold separately

RCS-2100028-00

- Composite cable beard for E/// 1281 only
- Compatible with OEM mounts or Raycap mount sold separately



RCS-21133

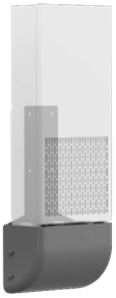
- Composite cable beard for E/// 6701 only
- Compatible with OEM mounts or Raycap mount sold separately

RCS-2001539-00

- Composite cable beard for Samsung AT1K radios
- Compatible with OEM mounts or Raycap mount sold separately

RCS-2100232-00

- Composite cable beard for Nokia AEUB radio
- Compatible with OEM mounts or Raycap mount sold separately



RCS-2000909-02

- 12.75" wide stainless steel cable beard for Amphenol panel antenna
- Note this is not compatible with all Amphenol models
- Antenna specifications must be verified prior to ordering

RCS-2102254-00

- 20" wide composite cable beard for macro panel antennas
- Mounts to antenna mounting pipe (2" - 5" STD pipe)

LIGHT ARMS

Teardrop

Pendant

French Quarter

Granville

Acorn

BSL 4

Cobra

Decorative Pendant

Mongoose

MID-POLE SHROUDS

Composite Shrouds

DOITT Side Mounted Shrouds

Raycap's non-metallic shroud was explicitly designed for the New York City (NYC) metro area. In some locations, installation on the ground is not possible. Whether due to lack of space, permit restrictions or even a costly installation of power and/or fiber cables for the connectivity, this scenario requires installing active equipment (antennas and connectivity enclosures) on or at the side of an existing structure. Raycap has developed several side-mounted solutions for existing light poles as well as additional wall mounted solutions. Single and multi-carrier configurations are successfully deployed throughout NYC using this solution.

- Compatible design to NYC guidelines
- Can support single or multi-carrier configurations
- Every configuration is accessed for thermal management
- Full in-house integration
- Computerized material tracking system tracks carrier's supplied components from their warehouse to our manufacturing/assembly facility to the installation site
- Improved intake louver design enables better circulation
- UL certified assembly
- PIM free tested per IEC 62037-8
- Easy installation
- Fabricated from RF friendly material
- Multiple color variations are available
- Made in the USA

Components

- Power and fiber management modules

DOITT Shroud (38" x 16" x 14")

Front View *Internal View* *Back View*

DOITT Shroud (35" x 15.5" x 9")

Front View *Internal View* *Back View*

5G Side Mounted Shrouds

RSE-21212

- Ergonomic design for easy radio installation and replacement
- Cover with InvisiWave mmWave friendly material
- InvisiWave is tested per UL 746C and meets requirements of an f1 rated material, suitable for outdoor use
- Entire solutions thermally tested according to GR-487
- Includes fiber and power management
- Offset bracket to minimize signal blockage components
- Supports various configurations

PASSENGER
CARS ONLY
W 68 ST
ONE WAY
ONE WAY

W 69 ST
ONE WAY
91

MID-POLE SHROUDS

RSCAC Series

Cabinet Components

- Internal equipment support brackets
- Active ventilation system (If applicable)
- Alarm sensors
- Cable routing fixtures
- Pole mounting kit

Additional equipment can also be provided and pre-installed including:

- AC disconnect
- Fiber-optic termination enclosure
- AC/DC power solutions (all-in-one)

RSCAC 1018

- Shroud uses passive vented design
- Door access design allows easy access
  - Belcore 216 quarter-turn door latches
- Pole mount brackets (included)
  - Allows (3) 1/2" bolts through wooden pole (customer supplied)
  - Banding slots for metal poles
- Construction
  - Aluminum shroud
  - Stainless steel mast supports
- Multiple color finishes available
- Multiple power and fiber configurations available

RSCAC-1018-1

Dimensions: 23"H x 19"W x 16"D
Volume: 4 cu ft

RSCAC-1018-2

Dimensions: 48"H x 24"W x 22"D
Volume: 15.1 cu ft

RSCAC-1018-32

Dimensions: 69"H x 18"W x 14"D
Volume: 10.1 cu ft

RSCAC-1018-34

Dimensions: 69"H x 21"W x 18"D
Volume: 15.1 cu ft

RSCAC Series

- Shroud uses passive or active vented design
- Door access design allows easy access
- Construction
  - Aluminum shroud
  - Stainless steel mast supports
- Multiple color finishes and dimensions available

RSCAC-1028

Dimensions: 36"H x 22.5"W x 22"D
Volume: 10.3 cu ft

RSCAC-1038

Dimensions: 48"H x 24"W x 20"D
Volume: 13.3 cu ft

RSCAC-1048

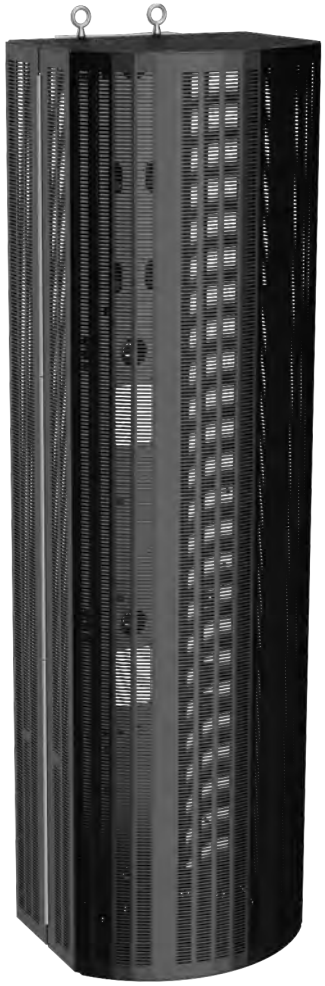
Dimensions: 69"H x 23"W x 22"D
Volume: 20.2 cu ft

MID-POLE SHROUDS

RSCAC Series

RSCAC-1019-XYZ

Dimensions: 69"H x 20"W x 16"D
Volume: 12.78 cu ft

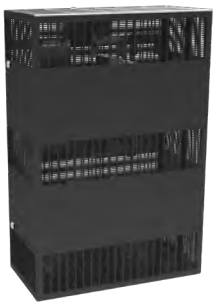


RSCAC-1029-XYZ

Dimensions: 36"H x 26"W x 22"D
Volume: 11.9 cu ft

RSCAC-1435-1Y5

Dimensions: 48"H x 24"W x 20"D
Volume: 13.3 cu ft



RSCAC-6246-XY4

Dimensions: 60"H x 28"W x 21"D
Volume: 20.4 cu ft

RSCAC-2819-XYZ

Dimensions: 36"H x 23"W x 22"D
Volume: 10.5 cu ft

RSCAC Series

- Shroud uses passive vented design
- Door access design allows easy access
  - Belcore 216 quarter-turn door latches
- Pole mount brackets (included)
  - Provision for two ½ - ¾ mounting bolts (rods)
  - Banding slots for metal poles
  - Powder coated galvannealed steel
- Construction:
  - Aluminum shroud
- Multiple color finishes available

Cabinet Components

- Internal equipment support brackets
- Pole mounting kit

RSCAC-SH22-351414

Dimensions: 35"H x 13"W x 14"D
Volume: 3.97 cu ft

RSCAC-SH23-482212

Dimensions: 48"H x 22"W x 12"D
Volume: 7.33 cu ft

RSCAC-SH24-482614

Dimensions: 42"H x 36"W x 14"D
Volume: 12.25 cu ft

Shipped with integrated AC disconnect

Strikesorb 30-V1-2CHV

MID-POLE SHROUDS

RSCAC Series

RSCAC-SH27-462715

Dimensions: 46"H x 27"W x 15"D
Volume: 10.78 cu ft

RSCAC-SH40-401610

Dimensions: 40"H x 16"W x 10"D
Volume: 3.70 cu ft

RSCAC-SH41-361812

Dimensions: 36"H x 18"W x 12"D
Volume: 4.50 cu ft

RSCAC-SH26-532616

Dimensions: 53"H x 26"W x 16"D
Volume: 12.67 cu ft

RSCAC-SH55-552316 PX

Dimensions: 55"H x 23"W x 16"D
Volume: 11.71 cu ft

RSCAC-SH55-552316 Ax (Active Cooling Option) also available

RSCAC Series

RAES-215004-A

Dimensions: 60"H x 17"W x 14"D
Volume: 8.3 cu ft

RSCAC-SH65-652215

Dimensions: 65"H x 22"W x 15"D
Volume: 12.41 cu ft

RSCAC-SH60-602624

Dimensions: 60"H x 26"W x 24"D
Volume: 21.67 cu ft

RSCAC-SH65-653015

Dimensions: 65"H x 26"W x 20"D
Volume: 19.56 cu ft

RSCAC-SH65-652620

Dimensions: 65"H x 26"W x 20"D
Volume: 19.56 cu ft

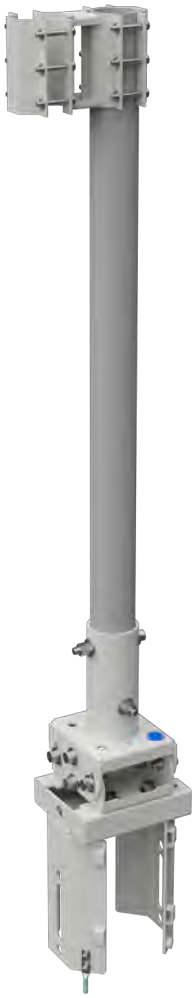
4G+5G WOOD POLE TOP MOUNTS

RTR Series

- Accommodates all small cell 4G panel antennas through various adapter plates
- Variable pole diameter – Attaches to most common sizes
- All structural steel powder-coated Galvannealed finish to customer color specification
- PIM free tested per IEC 62037-8
- Included bubble-level assists in precise and easy installation
- Universal wood pole base or custom metal pole base available
- Each unit ships with the RTR-Series Universal Top-Mount Base

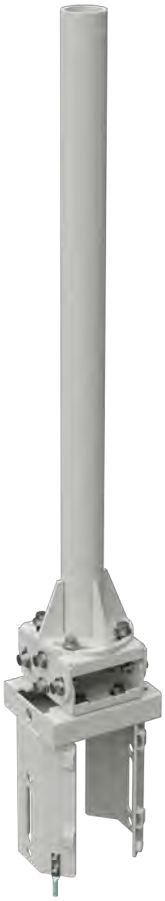
RTR Series Universal

RTR-FG-TRBR



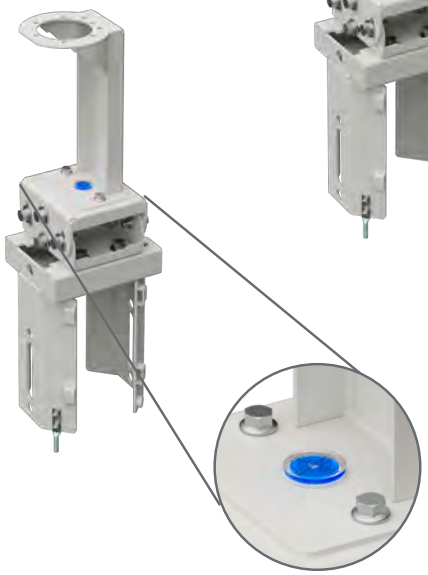
RTR-TRBR

RTR-5G-CM



RTR-CMM-NT

RTR-FXG



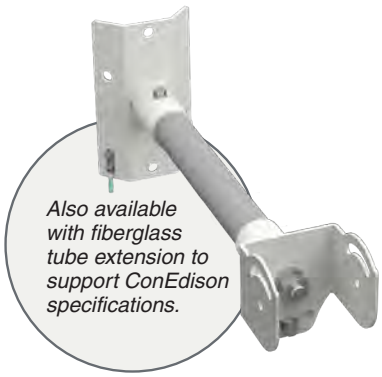
Leveling Bubble Included

RTR-CM

4G+5G WOOD POLE SIDE MOUNTS

RSM Series

RSM-Series Universal



RSM-CMM

Leveling Bubble Included

RSM-FXGL

RSM-CMM-PA

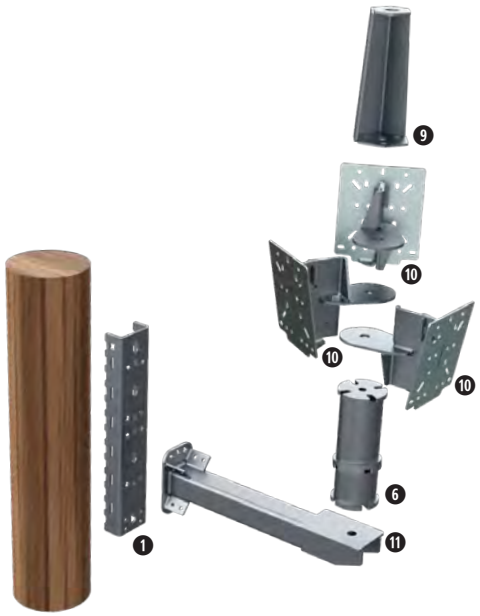
4G+5G WOOD POLE MODULAR COMPONENTS

Our modular series offers nearly endless combinations that can be made with a set of modular components.
Available options are not limited to the following pre-built assemblies, which are intended to inspire.

All common OEMs are supported.

Please inquire with any specific requests.

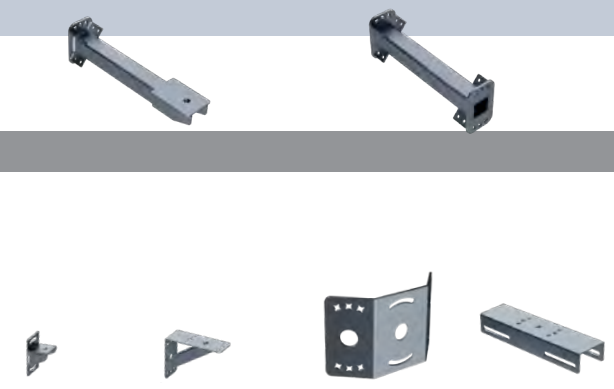
- The modular system can be employed to fit almost any custom equipment configuration.
- Accommodates all 5G mmWave radios or small panel, whip, or canister 4G antennas.
- Variable pole diameter – Attaches to most common sizes
- All structural steel hot dip galvanized per ASTM A123 with optional powder coated finish. See Appendix for available colors.
- Integrated leveling is provided in three axes for all technologies, and bulls-eye leveling dots are included.



RSM-M-22227 4G & 5G Tall Leg Side Mount Exploded View

Modular Components

Connection to Pole		
❶	M-22922	Base component for most topper and side arm assemblies, two universal mounting patterns
❷	M-22080	Base component, single universal mounting pattern
❸	M-22780	Triple clamp assembly, 7" diameter poles
Leveling		
❹	M-22062	Light duty leveling for omni-directional whip and canister antennas, up to 5° in any direction
❺	M-22231	Heavy duty leveling assembly, tall, extra clearance for large 5G radios, up to 10° in any direction
❻	M-22436	Heavy duty leveling assembly, compact, up to 10° in any direction
Equipment Mounting – Radios And Antennas		
❼	M-22643	Whip antenna mount, bolt
❽	M-22047	Whip antenna mount, clamp
❾	M-22858	Omni-directional canister antenna mount
❿	M-22078	Radio mounting bracket, 10° downtilt, 5° uptilt, supports all major radios
Side Arm Options		
⓫	M-22193	Side arm, single-bolt pattern
⓬	M-22291	Side arm extension, universal mounting pattern
Adapter/Extension Brackets		
⓭	M-22925	Converts between the universal mounting pattern and single-bolt mount pattern
⓮	M-22585	90° universal mounting pattern adapter, also supports single-bolt pattern
⓯	M-22774	Provides two additional universal mounting locations
⓰	M-22919	For bridging between two legs (M-22922) to support a large topper assembly



Single Leg

Options are for light-duty installations, down to 5.5" diameter poles.
Mounts via thru-bolts and / or straps

RTR-M-22523

Single Whip Antenna

RTR-M-22092

Whip and Single Elevation of 5G

RTR-M-22148

Canister and 5G

Dual Leg

These options support more and larger equipment and up to 13" diameter poles.
Mounts via thru-bolts and / or straps.

RTR-M-22783

Canister and 5G Above Pole

RTR-M-22238

5G Elevated Above Pole

RTR-M-22336

Canister and 2 Elevations of 5G

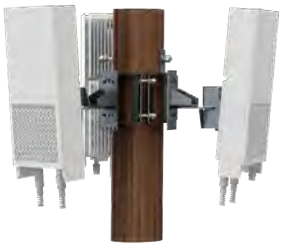
4G+5G WOOD POLE MODULAR COMPONENTS

Triple Clamp

Feature clamping with additional thru-bolt option. Fits 7" - 13" diameter poles.

REM-M-22081

5G Triple Clamp Assembly



REM-M-22244

Omni-mount
Triple Clamp Assembly

Short Bracket

Mounts via thru-bolts and / or straps.

RSM-M-22815

Single 5G Radio

RSM-M-22487

5G Side Mount Low Profile

Tall Bracket

With side arm – thru-bolt and/or strap mounting, side arm available in multiple lengths.

RSM-M-22162

5G Side Mount

RSM-M-22291

5G Side Arm Mount

RSM-M-22227

4G & 5G Side Mount

Double Sided

Equipment mounted on both sides of the pole, thru-bolt and/or strap mounting.

RSM-M-22844

Dual 4G & 5G Side Mounts

4G+5G WOOD POLE EXTENSION MOUNTS

Raycap's line of 4G+5G specialized extension mounts for wood poles provides excellent mounting solutions for various radios or antennas.

RATM-211501-A

- 4G/5G wood pole solution
- Supports various pole ODs
- Fiberglass extension
- Tri-sector mmWave radio mounts with downtilt shown with Samsung AT1K radios

RATM-211501-ST

- 4G/5G wood pole solution
- Supports various pole ODs
- Fiberglass extension
- Dual-sector mmWave radio mounts with downtilt shown with Nokia AEUD/E radios

COMPLETE SIDE-MOUNTS

Our complete side-mounted hardware series enables the easy mounting of radio and antenna systems to the sides of wood or steel poles.

REM-3099

- Side arm mount for 4G Omni and supporting radios
- 5G radios may be banded to the pipe mast as shown with Nokia AEUD/E
- Can be strapped or thru-bolted to wood or steel poles

REM-1348

- Side mounted enclosure for (3) E/// 220x radios
- Fully concealed 4G Omni within radome
- Can be strapped or thru-bolted to wood or steel poles

RSM-4651-5

- Side mounted enclosure for (3) E/// 220x radios
- Elevated radome for 5G radios mounting as shown with E/// 1281
- Can be strapped or thru-bolted to wood or steel poles

RSM-20247

- Side mount frame for 4G Omni and supporting radios
- 5G radios may be banded to the pipe mast as shown with E/// 1281
- Can be strapped or thru-bolted to wood or steel poles

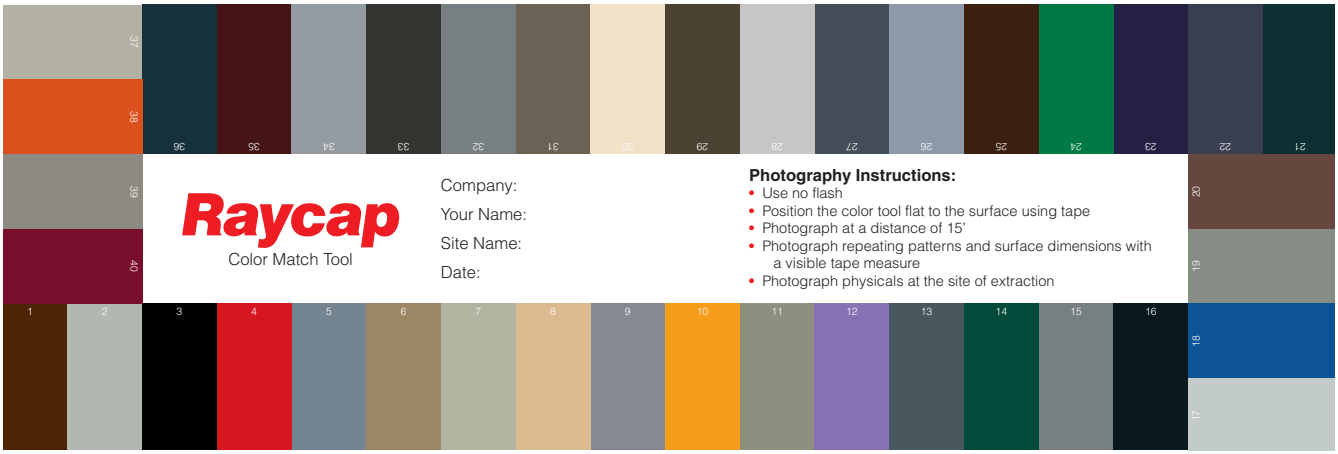
GALVANIZING, POWDER COATING & PAINTING

Our state-of-the-art in-house galvanizing, powder coating, and painting facilities are all together under one roof so we can offer our customers economy and the ability to slice time to market off their jobs. Our production workforce is trained to pay close attention to detail. Highly experienced personnel with years of tenure in the company have an understanding of the high-quality standards needed to ensure our customers are always delighted with the final outcome.

Our powder coat booths accommodate poles of up to 42 foot for wash, dry-off, application, and dual ovens operate for maximum productivity.

ARTIST PAINTING

An important part of the concealment business is matching an existing texture, color value, or hue to blend seamlessly into any environment. Our custom artist shop is an invaluable resource to our customers, helping them to achieve suitable material treatments, color matches and textures to give the desired effect. Customers use our artist-created Color Match Tool to photograph the closest match to whatever surface must be recreated, then send it back to us. Then our team presents the best solution to meet and exceed any project requirements.



LASER & PLASMA CUTTING

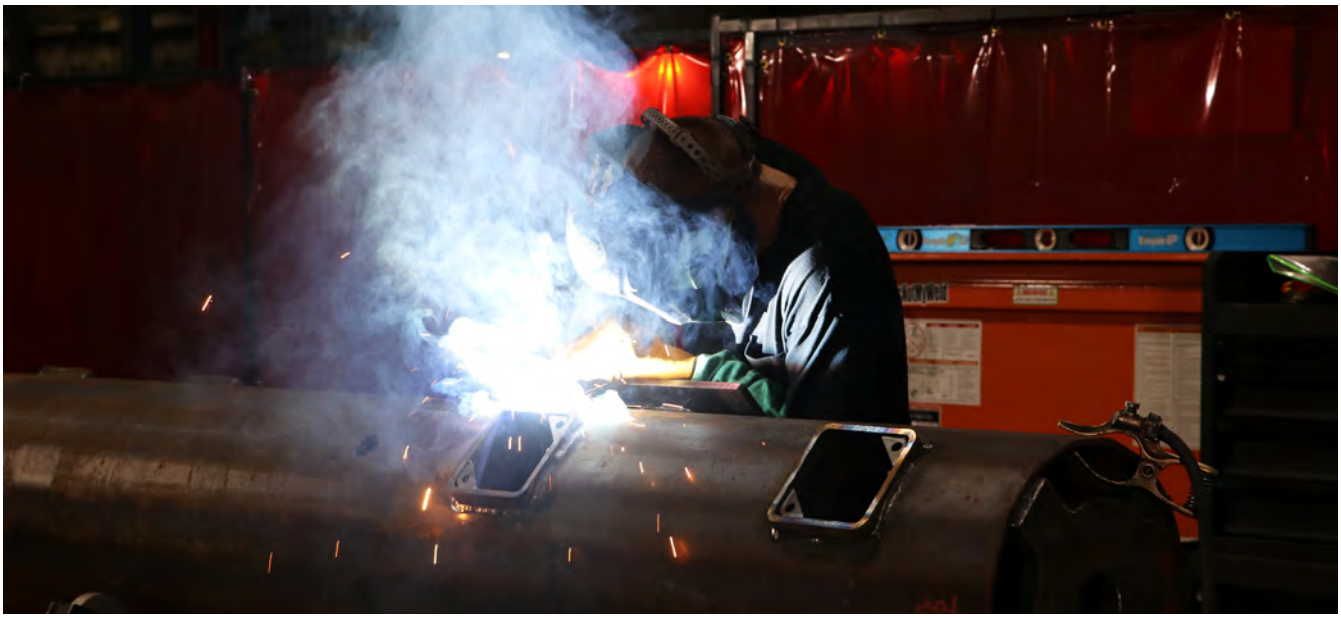
Our laser and plasma cutting capabilities are extensive, unique, and designed to help us produce customer materials quickly and effectively on time and budget. The laser cutter is a workhorse capable of cutting up to 1" thick material in a 5' x 10' sheet. Our plasma cutter can cut 10' x 20' sections of up to 2.5" thick, while our pipe plasma machine is capable of producing custom pipes up to 1.5" thick, 42' long, and up to 24" in diameter.

FORMING & ROLLING

Our capabilities include the rolling, forming, and bending of steel to support our customers' small cell pole needs. Steel poles are formed and bent to accommodate light arms and other pole attachments. In addition, metal forming and rolling are used to produce decorative bases, metal fluting, cable shrouds, and more.

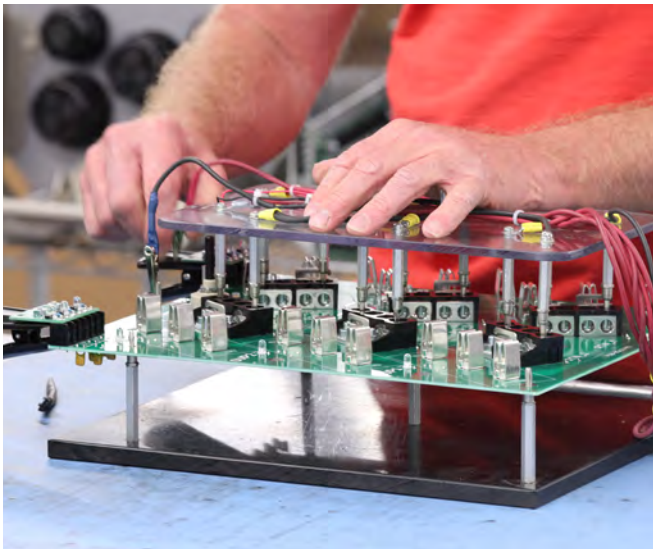
WELDING

Raycap's welders deploy many processes and a wide range of welding techniques. The capabilities of our highly skilled fabricators can be seen in the many diverse custom-designed small cell pole concealment configurations made to meet operator and municipality requirements.



ASSEMBLY

Many Raycap products are custom-built for unique customer applications and to their specifications. There is a high level of vertical integration in our products and their core elements to adapt the manufacturability and assembly of product lines based on the needs of our customers.



SMALL CELL POLE PHOTO GALLERY

POLE TOP SHROUDS PHOTO GALLERY

POWER MANAGEMENT SOLUTIONS

METERBASE & AC DISCONNECTS

RMx-E2 Series

The product offers a tightly integrated ringless meterbase and AC Disconnect functionality in one narrow enclosure (only 9.5" wide) to better blend into the environment when pole-mounted.

- Suitable for Use as Service Equipment (SUSE) without condition per UL and NEC with 60A or 100A main breaker
- Up to twelve circuits for individual power control and over current protection
- Comes standard with either (12) or (2) DIN rail 13mm breakers providing (12 or 2) 120VAC circuits which can be bridged to provide (6 or 1) 240V feeds
- 120/240VAC split-phase or 2 of 3 phases from 208Y/120VAC configuration
- Available surge protection
  Strikesorb 30-A-2CHV Surge Protective Device (SPD)
  - Class I SPD, certified by VDE per the IEC 61643-11 standard as suitable for installation in areas where induced lightning exposure is expected
  - Withstand direct surge currents up to 5kA (10/350µs) and induced surge currents of up to 60kA (8/20µs)
  - Low let through / clamping voltage - as it does not employ spark gaps or other switching elements
- Lockable front hatch access to the main breaker (optional).
- Main power can be turned on and off without opening the main enclosure door. Lockout Tagout (LOTO) functionality.
- Flexible mounting options for walls, poles or H-Frames
- Top, bottom, side or rear cable entry allows for cleaner, more flexible installations
- Patent pending design

AC Disconnects

The RSCAC and RSx-Series are 120/240 VAC industry standard load centers and surge protection devices that are suitable for use as service equipment (SUSE) with NO conditions per UL and NEC. They are designed to provide robust overvoltage surge protection for the AC power circuits for today's small cell radio systems. They employ patented Strikesorb 30-A-2CHV modules capable of withstanding direct surge currents up to 5 kA (10/350 µs) and induced surge currents up to 60 kA (8/20 µs). These products provide dual (L1 to N) (L2 to N) protection for up to 16 AC circuits depending on the model.

Common and Standard Features

- Suitable for use as Service Equipment SUSE with NO condition per UL and NEC
- 120/240 VAC, up to 100 A installations
- Load breakers can be 2 A - 25 A rated (RSx-Series) or 15 A and 20 A tandems (RSCAC-Series)
- Tightly integrated AC disconnect, AC distribution and AC surge protection in one cabinet
- Strikesorb overvoltage protection (OVP) on AC circuits
- Ruggedized industrial construction, most with top and bottom cable access for maximum flexibility and space-savings in small cell deployments
- Rigorous weatherproof enclosure options: NEMA 4 (for hose down/ sprinkler protection), NEMA 4x (for corrosive locations), and even NEMA 6/6p (IP68) for temporarily submerged locations like street hand holes
- Optional AC GFI protected outlet and/or various means of external disconnects are available on some models

RSD-FMC-Z16MS-21NN
(16 Breakers, Strikesorb SPD, External Disconnect)

AC DISCONNECTS

Common and Standard Features

- Suitable as Service Equipment (SUSE) with NO condition per UL and NEC
- 60 A or 100 A main breaker
- 120/240 VAC
- Up to 16 circuits available
- Strikesorb 30-A-2CHV SPD (L1-N, L2-N)
- Metallic enclosure, NEMA 4
- 9"W × 6"D (Height depends on breakers)
- Versatile mounting bracket included

RSx-D Series

- 60 A or 100 A main breaker, 10 kAIC
- NEMA 4 rated powder coated steel enclosure
- Top, bottom, side cable access
- Ships with 2 to 10 breakers

RSD-DMN-X10MS-21NN

RSD-DML-X10MS-21NN
– Hinged-Cover External Disconnect

RSD-DML-Z16MS-21NN
(Lt. Gray color, 10 Breakers, Strikesorb SPD, External Disconnect)

RSx-E Series

- 60 A or 100 A main breaker, 10 kAIC
- NEMA 4 rated powder coated steel enclosure
- Top, bottom, side cable access
- Ships with 2 to 10 breakers

RSD-EMN-Z12MS-21NN

RSD-EML-Z12MS-21NN
– Hinged-Cover External Disconnect

RSD-EML-Z12MS-21NN
(Lt. Gray color, 10 Breakers, Strikesorb SPD, External Disconnect)

RSx-F Series

- 16x configurable breakers provided (Load breaker list [ampacities and quantities - total 16] to be specified at the time of order.)
- 60 A or 100 A main breaker
- 10 kA Fault Current Rating (kAIC)
- Top, bottom and side cable/conduit access
- 18.5" H × 9" W × 6" D
- NEMA 4 powder coated enclosure, available in multiple colors
- Versatile mounting bracket included

RSD-FMC-Z16MS-21NN
(16 Breakers, Strikesorb SPD, External Disconnect)

Model Number Configuration

RSa-FMb-c16MS-21NN

a: RAL color		
D		= Light Gray / RAL7047
G		= Green / RAL6012
B		= Black / RAL9011
N		= Brown / RAL7013
L		= Blue / RAL5022

b: LED & Ext. Disconnect	
N	= None
L	= Light and External Disconnect

c: Main Breaker	
X	= 60A Main Breaker
Z	= 100A Main Breaker

AC Disconnect Options

	Color Options		No External Disconnect	With External Disconnect & Status Light
60A Main Breaker	Light Gray / RAL7047		**RSD-FMN-X16MS-21NN**	**RSD-FML-X16MS-21NN**
	Green / RAL6012		**RSG-FMN-X16MS-21NN**	**RSG-FML-X16MS-21NN**
	Black / RAL9011		**RSB-FMN-X16MS-21NN**	**RSB-FML-X16MS-21NN**
	Brown / RAL7013		**RSN-FMN-X16MS-21NN**	**RSN-FML-X16MS-21NN**
	Blue / RAL5022		**RSL-FMN-X16MS-21NN**	**RSL-FML-X16MS-21NN**
100A Main Breaker	Light Gray / RAL7047		**RSD-FMN-Z16MS-21NN**	**RSD-FML-Z16MS-21NN**
	Green / RAL6012		**RSG-FMN-Z16MS-21NN**	**RSG-FML-Z16MS-21NN**
	Black / RAL9011		**RSB-FMN-Z16MS-21NN**	**RSB-FML-Z16MS-21NN**
	Brown / RAL7013		**RSN-FMN-Z16MS-21NN**	**RSN-FML-Z16MS-21NN**
	Blue / RAL5022		**RSL-FMN-Z16MS-21NN**	**RSL-FML-Z16MS-21NN**

AC DISCONNECTS

RSCAC-1333 Series

- 60 A main breaker
- 22 kA Fault Current Rating (kAIC)
- 6x configurable tandem breakers provided (12 Loads)
  (Default is 6x 15 A/15 A tandem breakers. Custom breaker lists can be specified at the time of order.)
- Bottom cable access
- 9"H × 9"W × 5"D
  NEMA 4X or IP 68 and NEMA 6/6P rated enclosure
- Versatile mounting bracket included

RSCAC-1333-P-240

RSCAC-1333-P-240-D

– Hinged-Cover External Disconnect

RSCAC-1333-PH-240

– No-hinge front door for concealment or pole applications

– Submersion up to 1 meter for 30 minutes

RSCAC-9556 Series

- 100 A main breaker
- 22 kA Fault Current Rating (kAIC)
- 6x configurable tandem breakers provided (12 Loads)
  (Default is 6x 15 A/15 A tandem breakers. Custom breaker lists can be specified at the time of order.)
- Bottom cable access
- 11"H × 9"W × 5"D
  NEMA 4X or IP 68 and NEMA 6/6P rated enclosure
- Versatile mounting bracket included

RSCAC-9556-P-240

RSCAC-9556-P-240-D

– Hinged-Cover External Disconnect

RSCAC-9556-PH-240

– No-hinge front door for concealment or pole applications

– Submersion up to 1 meter for 30 minutes

RSCAC-9550 Series

- 60 A main breaker
- 22 kA Fault Current Rating (kAIC)
- 6x configurable tandem breakers provided (12 Loads)
  (Default is 6x 15 A/15 A tandem breakers. Custom breaker lists can be specified at the time of order.)
- Top and bottom cable access
- 11"H × 9"W × 5"D
  NEMA 4X or IP 68 and NEMA 6/6P rated enclosure
- Versatile mounting bracket included

RSCAC-9550-P-240

RSCAC-9550-P-240-D

– Hinged-Cover External Disconnect

RSCAC-9550-PH-240

– No-hinge front door for concealment or pole applications

– Submersion up to 1 meter for 30 minutes

RSCAC-7038 Series

- 100 A main breaker
- 10 kAIC System Rating (due to GFI)
- 6x configurable tandem breakers provided (11 Loads + GFI) (Default is 6x 15 A/15 A tandem breakers. Custom breaker lists can be specified at the time of order.)
- Top and bottom cable access
- 14" H × 9" W × 5" D NEMA 4 rated enclosure
- GFI convenience outlet

RSCAC-7038-P-240

RSCAC-7038-P-240-D – Hinged-Cover External Disconnect

RSCAC-7239 Series

- 100 A main breaker
- 22 kAIC System Rating
- 6x configurable tandem breakers provided (12 Loads) (Default is 6x 15 A/15 A tandem breakers. Custom breaker lists can be specified at the time of order.)
- Top and bottom cable access
- 14" H × 9" W × 5" D NEMA 4 rated enclosure

RSCAC-7239-P-240

RSCAC-7239-P-240-D – Hinged-Cover External Disconnect

MOUNTING PEDESTALS WITH AC DISCONNECTS

RPDx-PA Series Mounting Pedestals

- Clean, consistent appearance for meterbase and site disconnect/ distribution functionality
- Universal back-panel design accepts all utility-approved meterbases
- Strong and durable powder coated metal construction includes flexible mounting-base for easy installation
- Available in different colors to meet jurisdiction requirements
- Overall height (Above Grade Level) of 72.5" accommodates full range of approved meter-face heights
- Allows flexible and unobtrusive access for utility-input and load-output conduit runs
- Pre-integrated assembly saves time and money during installation

Raycap's RSD-FML-X16MS-21NN Disconnect shown but ordered separately

RPD1-PA

Meter purchased separately. See Meter Socket below.

RPD2-PA

METER SOCKET

RMS-BL5-DPE

- 200 amp line-in service connections
- Slim form factor
- Ringless style meter base
- Stainless steel swinging style locking latch
- 4/O aluminum service wire
- Clean, consistent appearance for meterbase and site disconnect/distribution functionality
- Strong and durable powder coated metal construction includes flexible mounting-base for easy installation
- Available in different colors to meet jurisdiction requirements
- Allows flexible and unobtrusive access for utility-input and load-output conduit runs

Exterior

Interior

AC/DC COMBO POWER MANAGEMENT

RUSAC-1440-P-240

- 60 A main breaker
- DC power supply capable of providing up to 600 Watts at -54 VDC
- (2) 15 A DC outputs
- Employs the Strikesorb 30 Series Surge Protective Device (SPD)
- Passive or active cooling
- Indicator LEDs for AC available (1) and DC available (2)
- NEMA 3R rated enclosure suitable for outdoor

RUSAC-1AN2-P-240-1

- 100 A main breaker
- 120/240 VAC split phase configuration
- Up to six branch breakers providing (6) 120 VAC circuits or (3) 240 VAC circuits.
- Employs the Strikesorb 30 Series Surge Protective Device (SPD)
- DC power supply capable of providing up to 2000 Watts at -54 VDC (expandable to 4000 Watts)
- Externally visible indicator available for AC and DC
- Over current protection for up to 6x AC circuits and up to 4x DC circuits for customer use
- Air-to-air heat-exchanger maintains closed loop NEMA Type 4 environment for equipment. Prevents ingress of contaminants and moisture.

FIBER MANAGEMENT SOLUTIONS

FIBER ENCLOSURES

Raycap offers pole or wall mount fiber enclosures for indoor and outdoor use. They are specifically designed for fast deployment and easy customer connection, providing the ultimate flexibility and optimal fiber organization.

- Lightweight design
- IP65 sealing rate
- Minimum bending radius protection 30mm
- Customized configuration capacity available
- Allows integration of passive optical components
- Wall and pole mounted
- UV stable material for outdoor above ground use
- Passive convection cooling
- The standard kit contents include wall mounting brackets and splice protector sleeves
- Optional installation of 6 PLC splitters (PLC splitters are pre-connectorized only on the outputs.) Customization is available.

RTF-8028

- Splicing capacity of 8 fibers

RTF-3392

- Splicing capacity of 16 fibers

RTF-5238

- Splicing capacity of 6 fibers

RTF-3018

- Splicing capacity of 2 fibers

RTF-7054

- Splicing capacity of 4 fibers

RTF-3116

- Splicing capacity of 12 fibers

RTF-8818

- Splicing capacity of 24 fibers

FIBER CABINETS

RCF-2102078-00

- Aluminum construction 47" x 28" x 21"
- Robust and modular design
- Easy installation process
- Panel bended technology
- 120° door opening
- Up to 288 fibers out
- Supports LGX modules
- 64 LC parking positions
- Excellent fiber management

65

SPECIALIZED CONCEALMENT SOLUTIONS & INDOOR DAS SYSTEMS

ROOFTOP SOLUTIONS

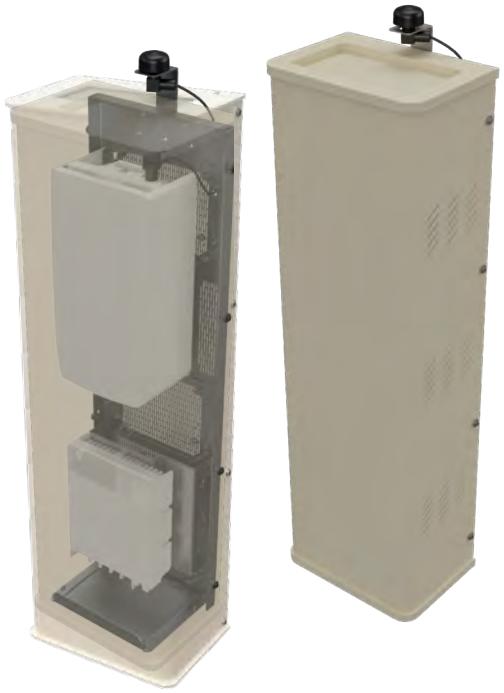
Product solutions covering rooftop small cell sites with a screen wall, chimney, pod, or cupola, are available from Raycap. Rooftop concealments complement existing construction, and hand-crafted faux brick, block, stucco, and stone textures seamlessly blend with buildings. Each small cell rooftop concealment is built based on specific needs, fully customized to fit the existing aesthetic.

Replica Antennas

Raycap's exclusive InvisiWave solution is approved for use at mmWave frequencies including 24 GHz, 28 GHz, and 39 GHz, as well as being fully backwards compatible with all commonly used sub-6 GHz frequencies.

RCM-3114-IW

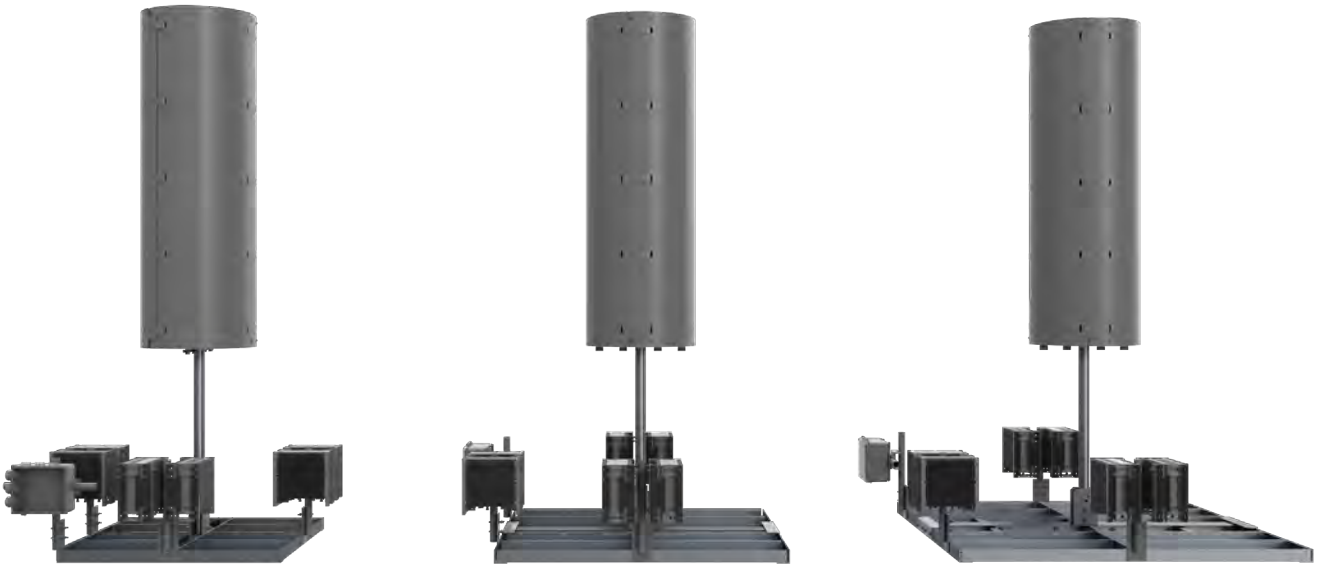
- Fabricated from RF friendly material
- Tested from low frequencies up to 100 GHz
- Suitable to concealing mmWave radios
- Features minimum dB loss
- PIM free tested per IEC 62037-8
- Thoroughly tested to identify beamforming impact
- Hydrophobic surface
- Compatible to back lobe mitigation techniques with use of upgrade kits
- Covers and hides from sight radios attached to poles or other structures without interfering in radio performance
- Easy to install
- Full range of heights and diameters available to meet virtually all concealment applications
- Compatible with 5G radios
- Patent pending design



Rooftop Pods

RBM-21068, RBM-21090 and RBM-21108

- (3) size frame options; small, medium and large
- 36" OD radome up to 9' tall
- Maximum overall height of 14' tall
- Holds up to (6) radios and (1) OVP
- Allows pipe adjustment up to 10 degrees for roof slope



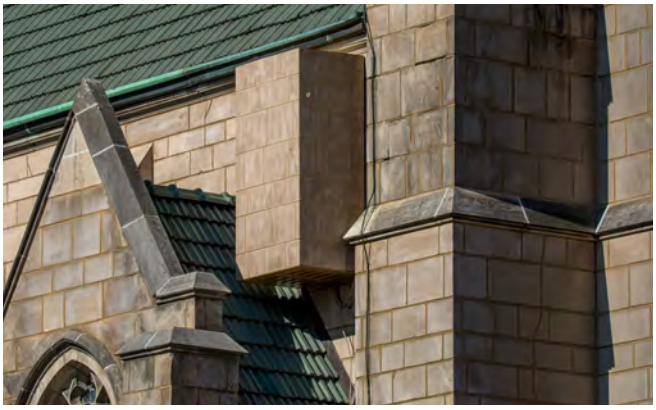
WALL MOUNTED SOLUTIONS

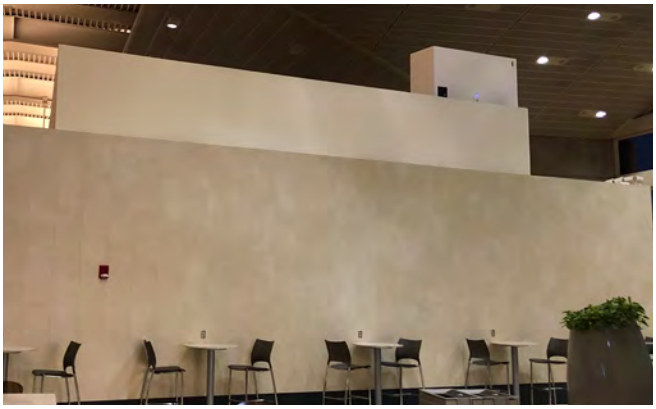
Product solutions covering rooftop small cell sites with a side-mounted box, pods, etc are available from Raycap.
Wall mounted box concealments complement existing construction, and hand-crafted faux brick, block, stucco, and stone textures seamlessly blend with buildings.

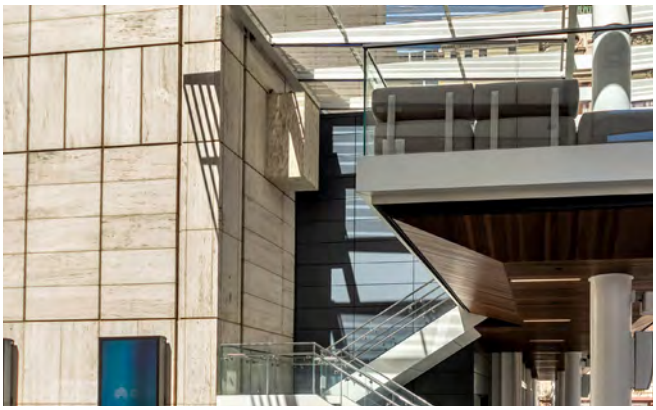
Custom Shrouds

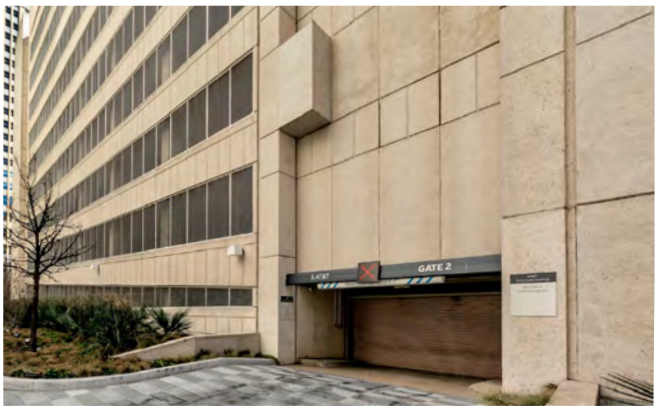
- Conceals small cell equipment
- Blends into any existing facility
- Round form factor shown; shrouds can be any shape including square, rectangular, or multisided
- Multiple operator and 5G mmWave InvisiWave versions are available

WALL & ROOFTOP SOLUTIONS GALLERY









RESEARCH & DEVELOPMENT

STANDARDS & CERTIFICATIONS

Steel Fabrication

- AWS D1.1 - Structural Welding Code - Steel
- ASTM A780 - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
- AQL Level II where C=0

Galvanization

- ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

Powder Coating

- ASTM D523 - Standard Test Method for Specular Gloss
- ASTM D3359 - Standard Test Methods for Rating Adhesion by Tape Test
- ASTM D522 - Standard Test Methods for Mandrel Bend Test of Attached

Organic Coatings

- ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test
- ASTM D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
- SSPC-SP1 - Solvent Cleaning
- SSPC-SP2 - Hand Tool Cleaning
- SSPC-SP3 - Power Tool Cleaning

UL Listings

- UL Listed Luminaire Poles – E483273
- UL Listed Cabinets and Cutout Boxes – E482338
- UL Listed Meter Sockets – E520977
- UL Listed Switchboards, Dead-Fronts – E248004
- UL 50: E482338, E487751
- UL 50 GR: E478163
- UL Meter Socket: E520977
- UL 891: E248004
- UL Wire Processing: E523898

Weld Inspection Notes

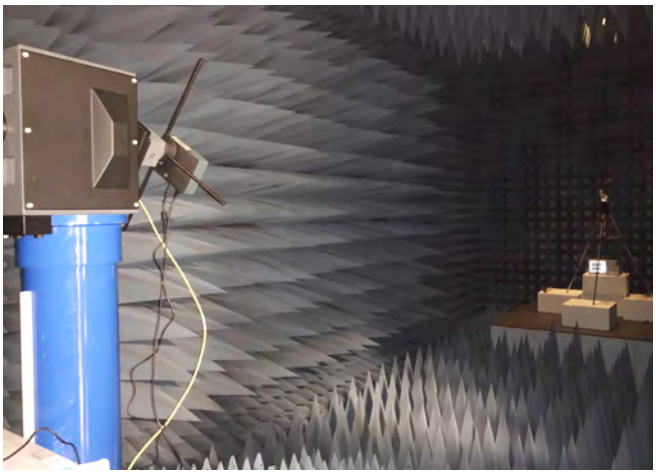
CWI weld inspection (pre, during, and post) is included in this proposal. MTRs, fabricator letter, fabrication photos, welder certs, and CWI certs will be provided at project completion upon request. NDE testing will be provided if a full penetration weld is performed and the requirement is noted on the drawings. The NDE test method(s) performed will be at the discretion of the CWI (typically Magnetic Particle testing for fillet welds and Ultrasonic testing for full penetration welds) unless the test method is specifically noted on the drawings or requested by the customer.

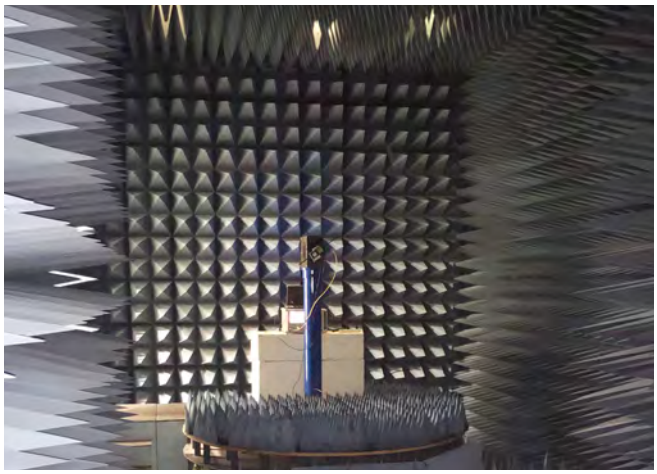
TESTING & MEASUREMENT

RF Testing

Raycap conducts measurements for its North American products in an RF (radio-frequency) anechoic chamber at its partner's facilities in San Antonio, Texas. Southwest Research Institute (SwRI) and Raycap have a 10+ year testing history, managing demanding testing requirements.

RF propagation through concealment material has been critical for wireless service providers as concealment should not compromise the signal quality and service level. Because of this, Raycap has significantly invested in signal generators, network analyzers, beamforming transmitters, and PIM analyzers. All results are recorded for every material that is considered for concealment solutions. Raycap has also developed RF propagation models based on measurements for several frequency bands and therefore is in a position to define, with details, the RF performance in any spectrum region.





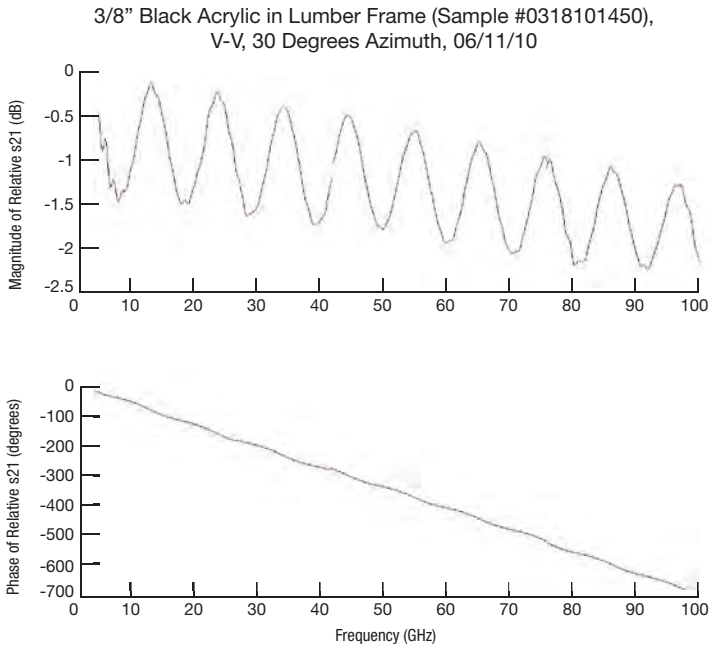


Figure 48: Results for Sample #0318101450, V-V, 30 Degrees

PIM Testing

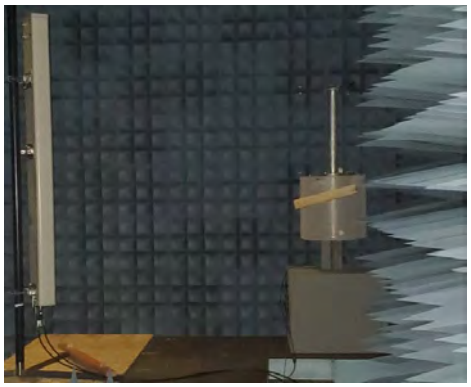
Raycap investigates potential interference issues that its concealment solutions may cause. Therefore, Passive Intermodulation (PIM) testing is performed in Southwest Research Institute's Anechoic RF chamber. The 700 MHz LTE and 850 MHz Cellular bands are tested using a cellular panel antenna and two PIM Analyzers. Both analyzers are configured to transmit 20 Watts x 2 carriers at the antenna. Each product is centered in the horizontal and vertical main beam of the antenna at a distance of nine feet from the antenna radome.

Raycap

Passive Intermodulation

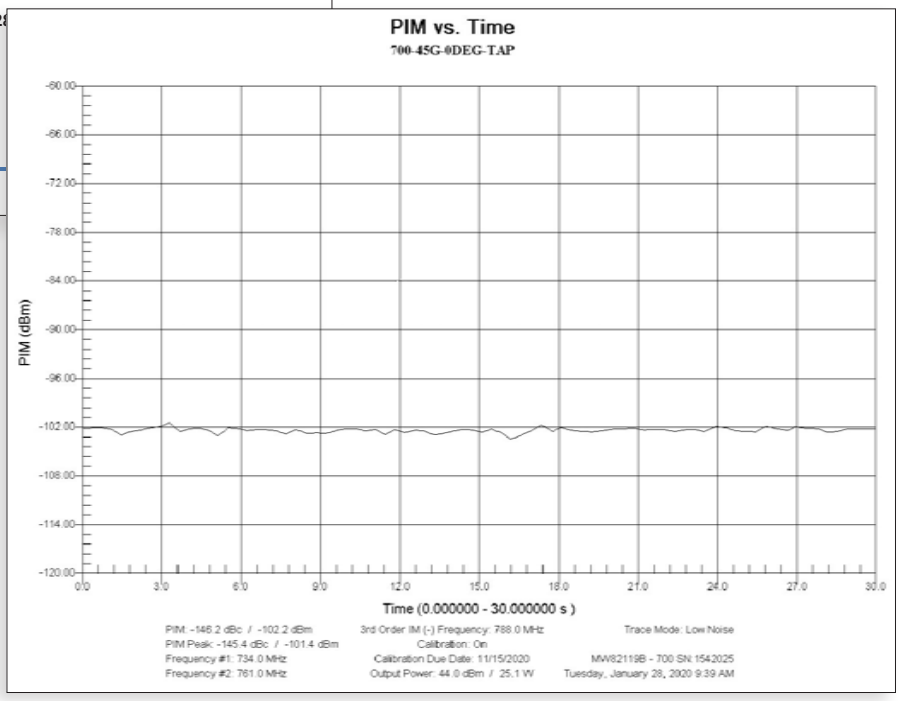
Testing Of

Raycap Modular Pole Topper Product



V1.1 – 2

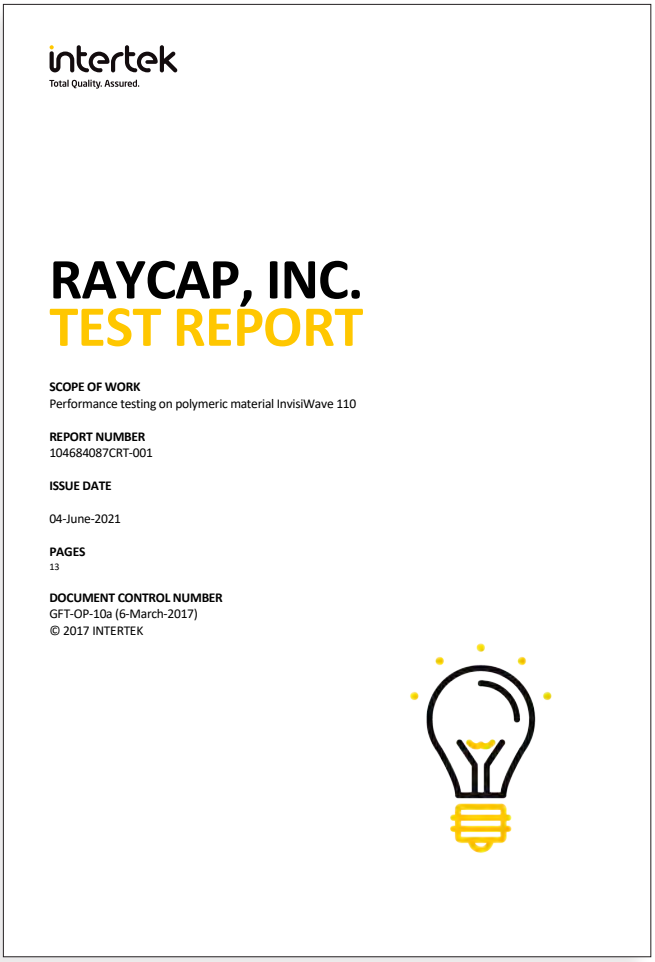
Raycap Inc. 1



Flammability Testing

Raycap investigates the flammability of material and makes sure its final solutions comply with national and local regulations. Every new material considered for use is tested as per the requirements contained in the below standards:

- UL Standard for Safety for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances;
- UL 94 6th Edition, Dated March 28, 2013 with revisions through May 6, 2021;
- UL 746A 6th Edition, Dated September 6, 2012 with revisions through June 27, 2020.


intertek
Total Quality. Assured.

RAYCAP, INC.
TEST REPORT

SCOPE OF WORK
Performance testing on polymeric material InvisiWave 110

REPORT NUMBER
104684087CRT-001

ISSUE DATE

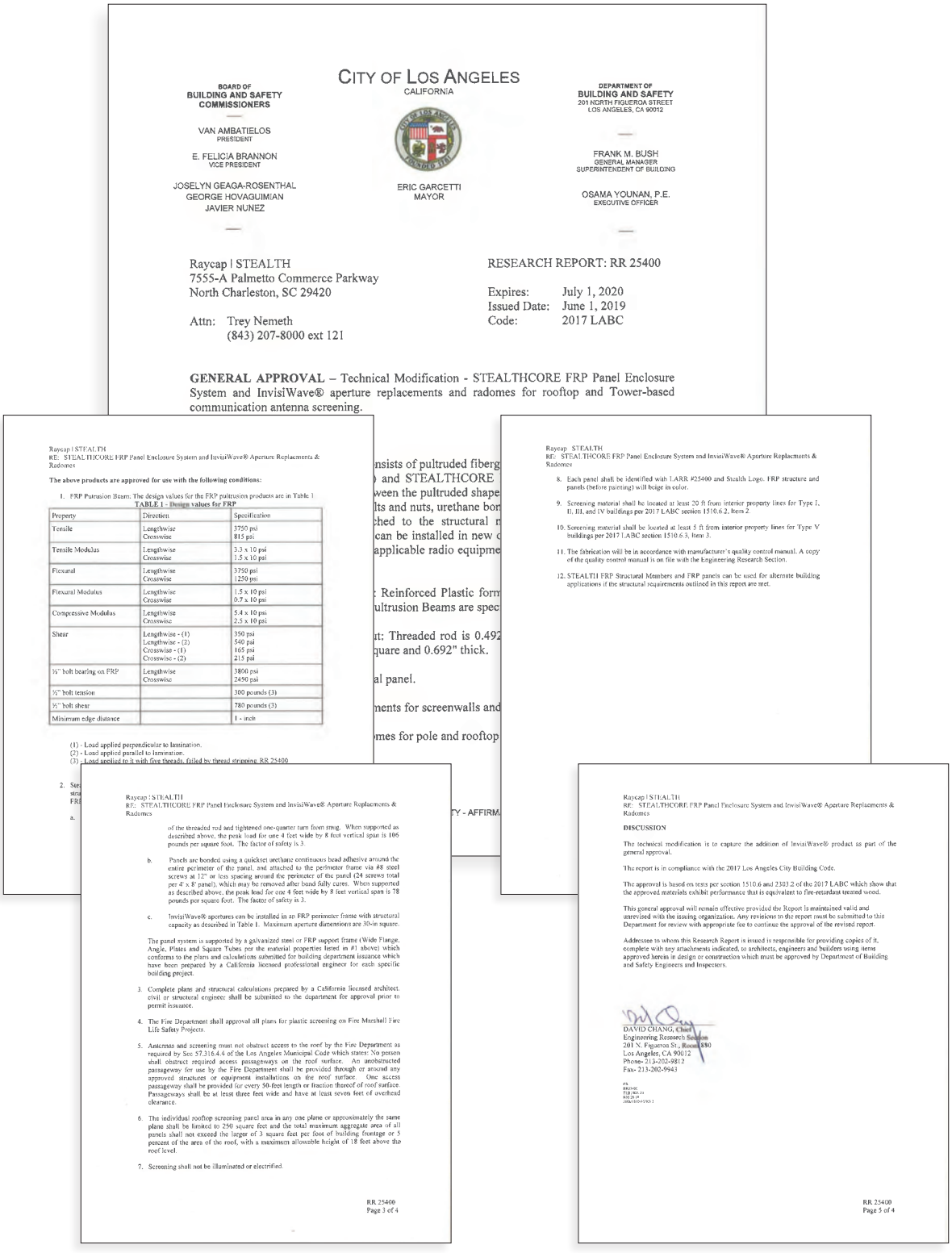
04-June-2021

PAGES
13

DOCUMENT CONTROL NUMBER
GFT-OP-10a (6-March-2017)
© 2017 INTERTEK

InvisiWave LARR Approval

InvisiWave®
5G-READY SOLUTION



CITY OF LOS ANGELES
CALIFORNIA

BOARD OF BUILDING AND SAFETY COMMISSIONERS
VAN AMBATIELOS, PRESIDENT
E. FELICIA BRANNON, VICE PRESIDENT
JOSELYN GEAGA-ROSENTHAL
GEORGE HOVAGUIMIAN
JAVIER NUNEZ

ERIC GARCETTI, MAYOR

DEPARTMENT OF BUILDING AND SAFETY
201 NORTH FIGUEROA STREET
LOS ANGELES, CA 90012
FRANK M. BUSH, GENERAL MANAGER, SUPERINTENDENT OF BUILDING
OSAMA YOUNAN, P.E., EXECUTIVE OFFICER

Raycap | STEALTH
7555-A Palmetto Commerce Parkway
North Charleston, SC 29420

Attn: Trey Nemeth
(843) 207-8000 ext 121

RESEARCH REPORT: RR 25400

Expires: July 1, 2020
Issued Date: June 1, 2019
Code: 2017 LABC

GENERAL APPROVAL – Technical Modification - STEALTHCORE FRP Panel Enclosure System and InvisiWave® aperture replacements and radomes for rooftop and Tower-based communication antenna screening.

Raycap | STEALTH
RE: STEALTHCORE FRP Panel Enclosure System and InvisiWave® Aperture Replacements & Radomes

The above products are approved for use with the following conditions:

1. FRP Pultrusion Beam: The design values for the FRP pultrusion products are in Table 1

TABLE 1 - Design values for FRP

Property	Direction	Specification
Tensile	Lengthwise Crosswise	3750 psi 815 psi
Tensile Modulus	Lengthwise Crosswise	3.3 x 10 psi 1.5 x 10 psi
Flexural	Lengthwise Crosswise	3750 psi 1250 psi
Flexural Modulus	Lengthwise Crosswise	1.5 x 10 psi 0.7 x 10 psi
Compressive Modulus	Lengthwise Crosswise	5.4 x 10 psi 2.5 x 10 psi
Shear	Lengthwise - (1) Lengthwise - (2) Crosswise - (1) Crosswise - (2)	350 psi 540 psi 165 psi 215 psi
½" bolt bearing on FRP	Lengthwise Crosswise	3800 psi 2450 psi
½" bolt tension		300 pounds (3)
½" bolt shear		780 pounds (3)
Minimum edge distance		1 - inch

(1) - Load applied perpendicular to lamination.
(2) - Load applied parallel to lamination.
(3) - Load applied to it with five threads, filled by thread stripping. RR 25400

Raycap | STEALTH
RE: STEALTHCORE FRP Panel Enclosure System and InvisiWave® Aperture Replacements & Radomes

of the threaded rod and tightened one-quarter turn from snug. When supported as described above, the peak load for one 4 feet wide by 8 feet vertical span is 106 pounds per square foot. The factor of safety is 3.

b. Panels are bonded using a quickset urethane continuous bead adhesive around the entire perimeter of the panel, and attached to the perimeter frame via #8 steel screws at 12" or less spacing around the perimeter of the panel (24 screws total per 4' x 8' panel), which may be removed after bond fully cures. When supported as described above, the peak load for one 4 feet wide by 8 feet vertical span is 78 pounds per square foot. The factor of safety is 3.

c. InvisiWave® apertures can be installed in an FRP perimeter frame with structural capacity as described in Table 1. Maximum aperture dimensions are 30-in square.

The panel system is supported by a galvanized steel or FRP support frame (Wide Flange, Angle, Plates and Square Tubes per the material properties listed in #1 above) which conforms to the plans and calculations submitted for building department issuance which have been prepared by a California licensed professional engineer for each specific building project.

3. Complete plans and structural calculations prepared by a California licensed architect, civil or structural engineer shall be submitted to the department for approval prior to permit issuance.
4. The Fire Department shall approval all plans for plastic screening on Fire Marshall Fire Life Safety Projects.
5. Antennas and screening must not obstruct access to the roof by the Fire Department as required by Sec 57.316.4.4 of the Los Angeles Municipal Code which states: No person shall obstruct required access passageways on the roof surface. An unobstructed passageway for use by the Fire Department shall be provided through or around any approved structures or equipment installations on the roof surface. One access passageway shall be provided for every 50-feet length or fraction thereof of roof surface. Passageways shall be at least three feet wide and have at least seven feet of overhead clearance.
6. The individual rooftop screening panel area in any one plane or approximately the same plane shall be limited to 250 square feet and the total maximum aggregate area of all panels shall not exceed the larger of 3 square feet per foot of building frontage or 5 percent of the area of the roof, with a maximum allowable height of 18 feet above the roof level.
7. Screening shall not be illuminated or electrified.

RR 25400
Page 3 of 4

Raycap STEALTH
RE: STEALTHCORE FRP Panel Enclosure System and InvisiWave® Aperture Replacements & Radomes

8. Each panel shall be identified with LARR #25400 and Stealth Logo. FRP structure and panels (before painting) will beige in color.
9. Screening material shall be located at least 20 ft from interior property lines for Type I, II, III, and IV buildings per 2017 LABC section 1510.6.2, Item 2.
10. Screening material shall be located at least 5 ft from interior property lines for Type V buildings per 2017 LABC section 1510.6.3, Item 3.
11. The fabrication will be in accordance with manufacturer's quality control manual. A copy of the quality control manual is on file with the Engineering Research Section.
12. STEALTH FRP Structural Members and FRP panels can be used for alternate building applications if the structural requirements outlined in this report are met.

Raycap | STEALTH
RE: STEALTHCORE FRP Panel Enclosure System and InvisiWave® Aperture Replacements & Radomes

DISCUSSION

The technical modification is to capture the addition of InvisiWave® product as part of the general approval.

The report is in compliance with the 2017 Los Angeles City Building Code.

The approval is based on tests per section 1510.6 and 2303.2 of the 2017 LABC which show that the approved materials exhibit performance that is equivalent to fire-retardant treated wood.

This general approval will remain effective provided the Report is maintained valid and unrevised with the issuing organization. Any revisions to the report must be submitted to this Department for review with appropriate fee to continue the approval of the revised report.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by Department of Building and Safety Engineers and Inspectors.

DAVID CHANG, Chief
Engineering Research Section
201 N. Figueroa St., Room 880
Los Angeles, CA 90012
Phone- 213-202-9812
Fax- 213-202-9943

RR 25400
Page 5 of 4

Environmental Testing

Raycap pole coupons and hardware samples are tested to evaluate their resistance to a wide range of temperatures, humidity, weather, climate, and environmental stresses. Testing involves coupon sections of different sizes of poles as well as mounting and attachment hardware. Testing is intended to evaluate the resistance of each component to function-affecting physical damage or degradation from exposure to cyclic temperature and salt fog environments.

TEST REPORT

ENVIRONMENTAL TESTING OF THE
RAYCAP UN-GUYED STEEL CELLULAR
COMMUNICATION POLES COMPONENTS

SwRI Document Number: 18.18292.14.100.FR2

Issue 1

SwRI Project 18.18292.14.100

Prepared for:
Raycap, Inc.
Concealment Solutions
7555-A Palmetto Commerce Parkway
North Charleston, SC 29420

May 2020

Reviewed By:

Rick Pitman
Principal Engineering Technologist,
Structural Dynamics & Product Assurance

Approved By:

Jenny Ferren
Manager,
Structural Dynamics & Product Assurance

The results of this test report apply only to the specific samples tested. If the manufacturer extends the test results to apply to other samples of the same model, or from the same lot or batch, the manufacturer should ensure the additional samples are manufactured using identical electrical and mechanical components. This test report shall not be reproduced, except in full, without written approval of Southwest Research Institute.

SwRI

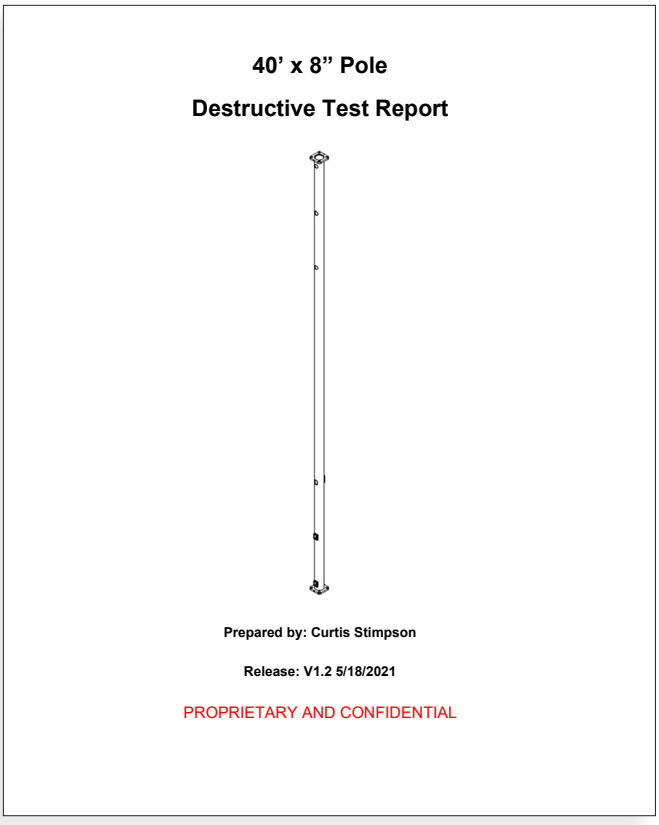
Southwest Research Institute®
6220 Culebra Road • Post Office Drawer 28510
San Antonio, Texas 78228-0510

Pole Structural Testing

Raycap investigates the structural integrity of its poles. A representative design of a standard nominal diameter is tested to failure. The applied loading is intended to approximate a severe wind event. Testing utilizes guidance from the cantilever method described in ASTM D1036, a standard normally applied to testing wood communications poles. The pole is mounted by the baseplate during testing in the horizontal orientation. A wheeled stand supports the center-of-gravity to provide a primarily unidirectional moment to the base of the pole. The load is applied 475 inches from the base of the pole, three inches from the top. The deflection is recorded at the midpoint and the tip of the pole.

Pole Mounted to Test Fixture (3UN Orientation)

Maximum Deflection (3UN)



40’ x 8” Pole

Destructive Test Report

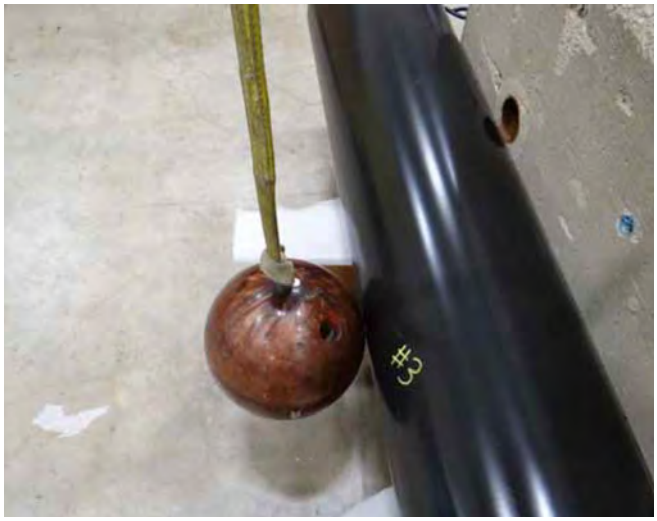
Prepared by: Curtis Stimpson

Release: V1.2 5/18/2021

PROPRIETARY AND CONFIDENTIAL

Impact Testing

Raycap pole samples are tested to evaluate their resistance to point impact damage. Testing involves sections of poles approximately five feet in length. Different steel pole sizes are tested, from 8" to 12" diameter. The point of impact testing is performed in accordance with the test methodology described in GR-3159-CORE. Testing is intended to evaluate the resistance of each sample to damage from point impacts, and is evaluated against both the bowling ball impact and a V-edge penetration test. The 100 ft-lb bowling ball impact should not result in any significant denting or deformation resulting in a >10% change in any characteristic dimension. For the V-edge penetration test, the V-edge mandrel is compressed into the pole until a force of 1,000 lbs is reached, and the maximum resulting penetration depth shall be less than 0.25 inch.



TEST REPORT

ENVIRONMENTAL TESTING OF THE
RAYCAP UN-GUYED STEEL CELLULAR
COMMUNICATION POLES COMPONENTS

SwRI Document Number: 18.18292.14.100.FR2

Issue 1

SwRI Project 18.18292.14.100

Prepared for:
Raycap, Inc.
Concealment Solutions
7555-A Palmetto Commerce Parkway
North Charleston, SC 29420

May 2020

Reviewed By:

Rick Pitman
Principal Engineering Technologist,
Structural Dynamics & Product Assurance

Approved By:

Jonny Ferren
Manager,
Structural Dynamics & Product Assurance

The results of this test report apply only to the specific samples tested. If the manufacturer extends the test results to apply to other samples of the same model, or from the same lot or batch, the manufacturer should ensure the additional samples are manufactured using identical electrical and mechanical components. This test report shall not be reproduced, except in full, without written approval of Southwest Research Institute.

Southwest Research Institute®
6220 Culebra Road • Post Office Drawer 28510
San Antonio, Texas 78228-0510

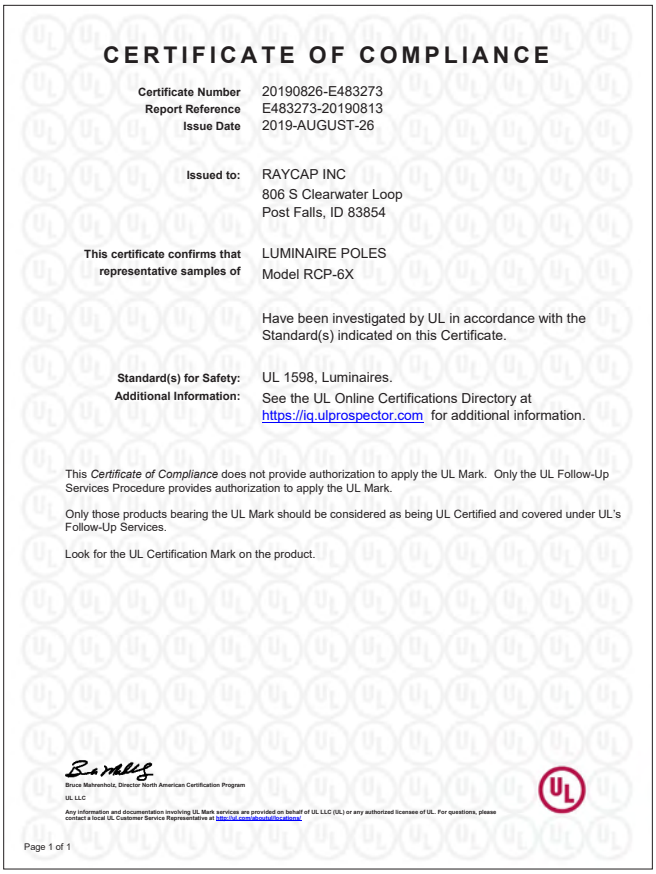
TESTING & MEASUREMENT

Electrical Safety

Raycap is the only supplier to certify its concealment poles per UL. The luminaire pole houses a proprietary load distribution center capable of providing up to 12 branch circuits at 120 VAC, or 6 branch circuits at 240 VAC. This distribution equipment is also certified to UL 67 Panelboards (E479137) and meets Suitable for Service Equipment (SuSE) requirements.

As part of the production line testing required under UL 1598, both a Bonding Circuit Impedance test and a Dielectric Voltage-Withstand test are taken.

Raycap recently completed all the necessary testing as per UL 1598 Standard for Safety. The relevant certificate of compliance follows.



CERTIFICATE OF COMPLIANCE

Certificate Number	20190826-E483273
Report Reference	E483273-20190813
Issue Date	2019-AUGUST-26
Issued to:	RAYCAP INC 806 S Clearwater Loop Post Falls, ID 83854
This certificate confirms that representative samples of	LUMINAIRE POLES Model RCP-6X
	Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	UL 1598, Luminaires.
Additional Information:	See the UL Online Certifications Directory at https://iq.ulprospector.com for additional information.

This *Certificate of Compliance* does not provide authorization to apply the UL Mark. Only the UL Follow-Up Services Procedure provides authorization to apply the UL Mark.

Only those products bearing the UL Mark should be considered as being UL Certified and covered under UL's Follow-Up Services.

Look for the UL Certification Mark on the product.

Bruce Mahrenholz, Director North American Certification Program

UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please contact a local UL Customer Service Representative at http://ul.com/aboutul/locations/

Page 1 of 1

INVISIWAVE SOLUTIONS

InvisiWave®

With more than 30+ years of experience creating innovative infrastructure solutions, Raycap knows how to create superior products that customers rely upon to ensure the integrity of their networks. With the acquisition of STEALTH in 2018, we gained 25+ years of experience in the concealment industry. Together, this combined expertise enables us to best help customers as they build out their small cell infrastructure and ultrafast 5G networks.

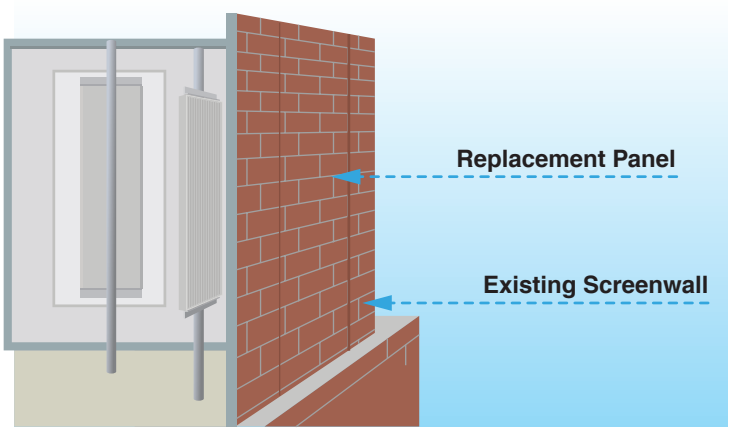
The new networks will use both C-band and 5G mmWave radios (sub-6 GHz, 24 GHz, 28 GHz and 39 GHz) and their associated MIMO beam forming antenna systems, and require a dense network of many thousands more sites than exist in the present day infrastructure. Concealing these added nodes had previously been a challenge because the use of some concealment materials had interfered with 5G performance. Not so anymore.

Raycap engineered InvisiWave, a patent-pending breakthrough, tested, concealment material that effectively conceals 5G mmWave and C-Band sites with practically zero interference. InvisiWave provides a way forward for carriers and municipalities who need to balance the demand for signal performance with aesthetic requirements at the street level. Available in many different concealment configurations, InvisiWave products will help customers take their 5G C-band and mmWave projects where they need to go.

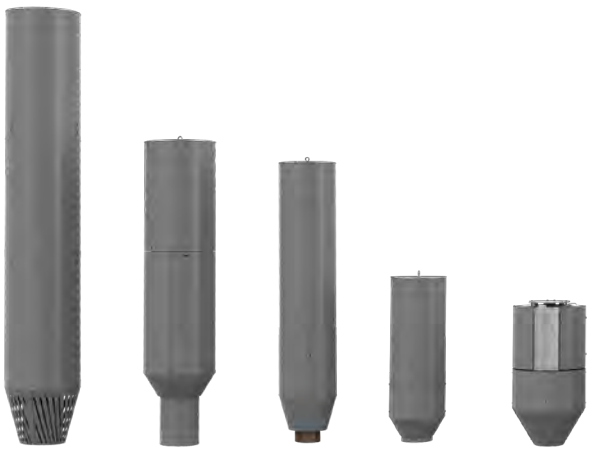
Features:

- Rigid surface
- Paint adhesion
- UV Resistant
- Hydrophobic surface
- Easy to fabricate and create in various form factors
- Chemical and fire resistance (UL 94, EN13501)
- Tested from 700 MHz to 100 GHz
- Thermal insulation
- Patent pending
- Minimum insertion loss (avg. 0.1 dB @ sub-6 GHz, 0° angle of incidence)
- (avg. 0.1 dB @ 28 GHz, 0° angle of incidence)
- (avg. 0.2 dB @ 24 GHz, 0° angle of incidence)
- (avg. 0.4 dB @ 39 GHz, 0° angle of incidence)
- Thoroughly tested to identify beam forming impact
- Compatible to back lobe mitigation techniques
- Class 'A' Fire Rated
- City of Los Angeles Approved (Dept. of Building & Safety LARR 25400)

Panel & Rooftop Products

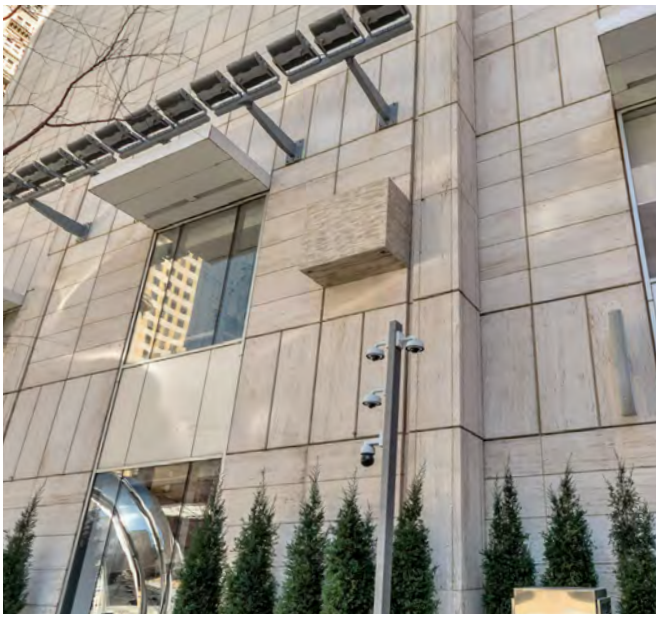


Pole Top Shrouds



InvisiWave for New Site Builds & Retrofit Projects

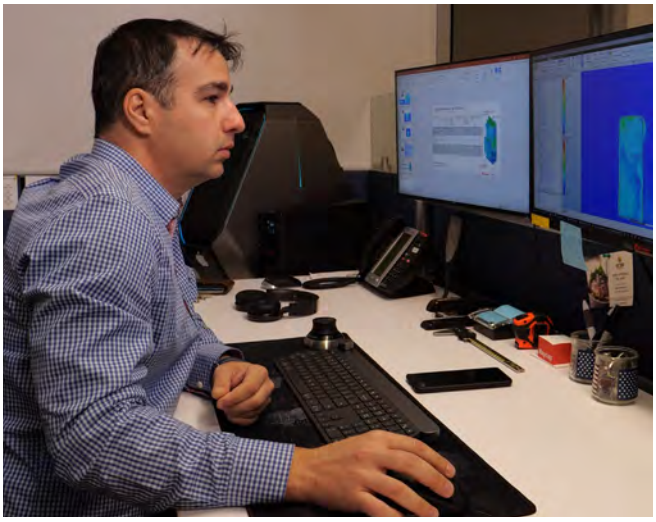
Raycap's InvisiWave panels offer site operators the option of ordering new or replacement panels to build a new, or retrofit an existing installation. Rain hoods and radio mounting kits can also be ordered.

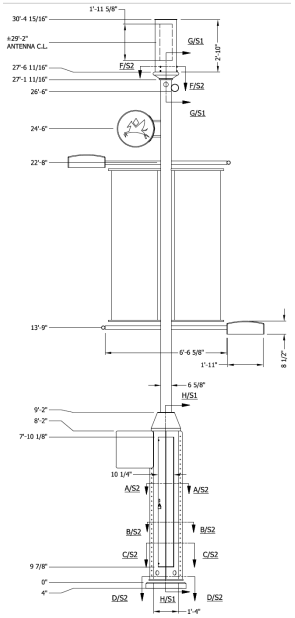


SERVICES

PRODUCT DESIGN

Raycap's global Research & Development (R&D) operation merges best-in-class facilities with some of the best engineering talent in the world. Raycap employs more than 125 engineers worldwide, providing design services for the company's diverse customer base. Capabilities include structural, electrical, RF, chemical, mechanical, electronic, and specialized telecom disciplines such as network architecture, fiber optics, RF, signal testing and PIM interference. Raycap's dedication to innovation is evident, and the engineering teams are driven to achieve excellence in everything they do.





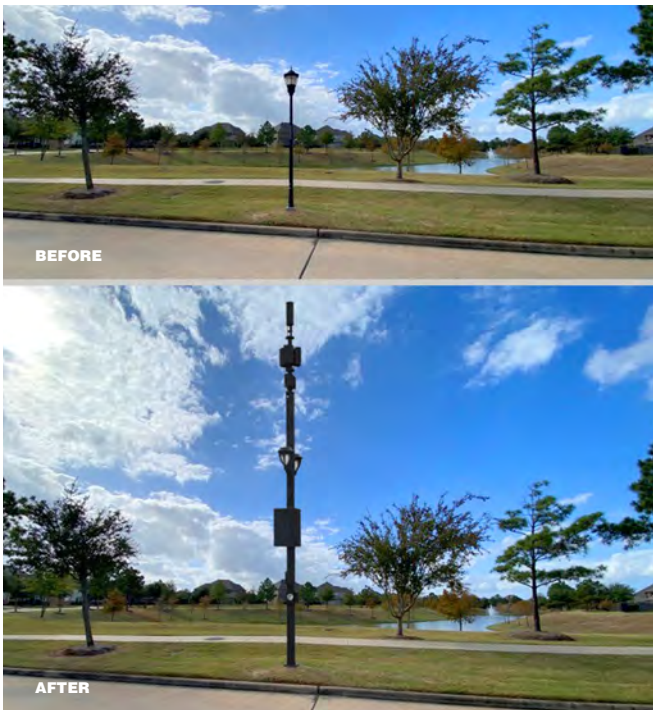
INTEGRATION

Our broad experience in integration services enables us to help our customers by manufacturing a fully or partially integrated concealed small cell pole product.

Raycap's integrated small cell poles arrive at a site location, with cabling, radios, and power/fiber equipment pre-installed and pre-tested. Fully integrated small cell poles can significantly reduce the time spent on installation. The pole needs to be set on the foundation and the power and fiber lines connected. Taking advantage of Raycap's expertise in integration saves our customers time and money.

PHOTO SIMULATIONS

A picture is worth a thousand words, and when only a photo rendering of what a product will look like in a particular environment will do, Raycap is there to help its customers visualize. Our graphic designers have the creative and technical ability to support your sales teams' requests for photo simulations, whether in a particular location or an imagined environment. We understand that the customer always comes first and that through these efforts, our customers can help their customers get projects through the many hurdles that can come with getting a small cell project approved.



THERMAL ANALYSIS

STEP 01

DOCUMENTATION

Provide CDs, Lease Exhibits, RFDS & equipment specs to Raycap sales team

STEP 02

FIT-UP

Raycap will complete equipment fit and identify pinch points

STEP 03

INITIATE THERMAL ANALYSIS

Using information from steps 1 and 2

STEP 04

THERMAL ANALYSIS RESULTS

If results pass, move to step 5

if not...

...further evaluation of equipment positioning, location, concealment size, fans, etc. will be incorporated to achieve a passing result

STEP 05

DESIGN

Move to design & engineering phase of project

STEP 06

FABRICATE

Begin concealment fabrication

SMART ACTIVE COOLING

RCP 4770 IP

Fan control units are designed to be mounted in telecom poles and can control as many as 15 AC fans located in various thermal zones. In addition, they monitor and alert on the state of the fan operation, alarming if malfunctioning occurs. These units are UL Listed for information technology equipment in wet and humid locations.

Features Include:

- Can control up to 15 fans based on ambient and monitored temperatures in thermally sensitive zones of a pole installation
- Variable AC fan speed – Speed of fan varied based on internal thermal sensor and optional external sensors (up to 3)
- Dry Contact Alarms
- Locked fan
- Fan disconnected
- External temperature sensor shorted or open
- Power outage
- Suitable for wet-rated environment

SITE VISITS & SURVEYS

By aiding our customers with site visits and surveys, Raycap offers seasoned perspectives with invaluable knowledge and resources for our customers. We can provide assistance about what has worked and provide new visionary concepts about what concealments could work in the future. Our strength is in our knowledge of materials and our many years of field test results.

STRUCTURAL ANALYSIS

Raycap designs in accordance with the 2015 International Building Code and the ANSI/TIA–222-G "Structural Standard for Antenna Supporting Structures and Antennas." Additionally, all steel members and connections are designed to meet the AISC Steel Construction Manual requirements.

An indicative set of criteria follows:

- Ultimate windspeed (V): 171 mph (3-sec gust) per the ASCE 7-10
- Ice: 0" radial ice (nominal) with 30 mph wind (3-sec gust)
- Basic windspeed of 60 mph (3-sec gust) for the service condition (deflection limitation only)
- Structure Class II, Exposure C, Topographic Category 1 with crest height of 0 ft
  (The criteria depend on local requirements and may vary.)

APPENDIX: RT SERIES

Model Number Configuration

Module 1 Module 2 Module 3 Module 4

RT-abbc-dd-ee-ee-ee-ee

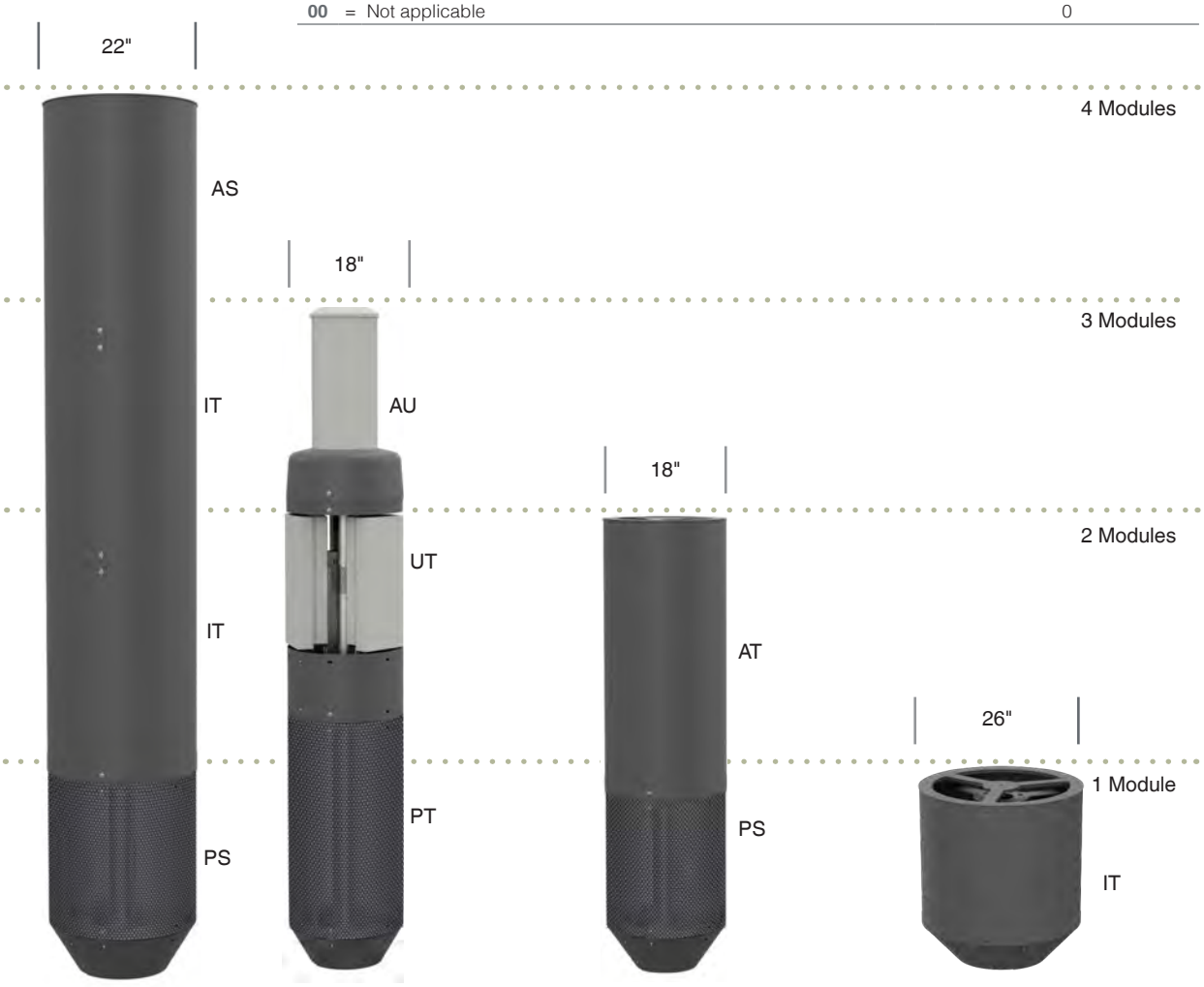
a: Existing Pole Material	
C	= Composite
M	= Metal
W	= Wood

bb: Existing Pole Diameter
= rounded to the nearest inch
Example: 7.25" = 07

c: Transition Amount	
0	= No Transition
6	= 60 Degree Transition

dd: Topper Diameter (in)		
18	=	Thin profile, supports up to 30 degrees of downtilt, full concealment of 5g radios not available in this diameter
22	=	Fully concealed, downtilt not supported
26	=	Fully concealed with limited downtilt (10-15 degrees), depending on radio

ee: Module Type			Module Height [if top module] (in)
AS	=	Omni antenna, InvisiWave concealment, short	36
AT	=	Omni antenna, InvisiWave concealment, tall	48
AU	=	Omni antenna, unconcealed	Varies with antenna
FS	=	Radio module, InvisiWave concealment, short, active cooling	24 [27]
FT	=	Radio module, InvisiWave concealment, tall, with active cooling (fans)	33 [36]
IS	=	Radio module, InvisiWave concealment, short, passive cooling	24 [27]
IT	=	Radio module, InvisiWave concealment, tall, passive cooling	33 [36]
PS	=	Radio module, perforated steel concealment, short	24
PT	=	Radio module, perforated steel concealment, tall	33
US	=	Radio module, unconcealed, short	24
UT	=	Radio module, unconcealed, tall	33
00	=	Not applicable	0



APPENDIX: RAL STANDARD COLOR SELECTION

	RAL #	Satin SKU	Color Name
	1001	RHS3-00004	Beige
	1003	RYS3-00001	Signal Yellow
	1013	RHS3-00001	Oyster White
	1018	RYS3-00003	Zinc Yellow
	1019	RHS3-00005	Grey Beige
	1023	RYS3-60010	Traffic Yellow
	1028	RYS3-60013	Melon Yellow
	1037	RYS3-60006	Sun Yellow
	2003	RES3-00001	Pastel Orange
	2004	RES3-20003	Pure Orange
	2010	RES3-20004	Signal Orange
	3000	RRS3-20009	Flame Red
	3001	RRS3-00001	Signal Red
	3002	RRS3-00004	Carmine Red
	3003	RRS3-00003	Ruby Red
	3004	RRS3-00007	Purple Red
	3005	RRS3-60002	Wine Red
	3020	RRS3-20010	Traffic Red
	4005	RRS3-20005	Blue Lilac
	5002	RLS3-20001	Ultramarine Blue
	5003	RLS3-20003	Sapphire Blue
	5005	RLS3-20007	Signal Blue
	5010	RLS3-20008	Gentian Blue
	5011	RLS3-20010	Steel Blue
	5012	RLS3-20009	Light Blue
	5013	RLS3-20011	Cobalt Blue
	5015	RLS3-20013	Sky Blue
	5017	RLS3-90001	Traffic Blue
	5019	RLS3-20015	Capri Blue
	5022	RLS3-60001-C25	Night Blue
	5024	RLS3-60003	Pastel Blue
	6005	RGS3-80002	Moss Green
	6009	RGS3-00025	Fir Green
	6012	RGS3-00003	Black Green
	6016	RGS3-00001	Turquoise Green
	6018	RGS3-00021	Yellow Green
	6027	RGS3-00015	Light Green
	6029	RGS3-60012	Mint Green
	7001	RAS3-00014	Silver Grey

	RAL #	Satin SKU	Color Name
	7004	RAS3-20001	Signal Grey
	7006	RHS3-00006	Beige Grey
	7011	RAS3-00018	Iron Grey
	7012	RAS3-20002	Basalt Grey
	7013	RGS3-00008	Brown Grey
	7016	RAS3-00005	Anthracite Grey
	7021	RBS3-00002	Black Grey
	7022	RNS3-20001	Umbra Grey
	7023	RGS3-00011	Concrete Grey
	7024	RAS3-20004	Graphite Grey
	7030	RAS3-00007	Stone Grey
	7032	RHS3-20002	Pebble Grey
	7035	RAS3-00030	Light Grey
	7037	RAS3-00020	Dusty Grey
	7038	RAS3-00010	Agate Grey
	7040	RAS3-00025	Window Grey
	7042	RAS3-00003	Traffic Grey A
	7043	RAS3-00019	Traffic Grey B
	7044	RAS3-00027	Silk Grey
	7045	RAS3-00024	Telegrey 1
	7046	RAS3-00023	Telegrey 2
	7047	RAS3-40005	Telegrey 4
	8008	RNS3-20008	Olive Brown
	8011	RNS3-20002	Nut Brown
	8014	RNS3-00002	Sepia Brown
	8016	RNS3-00012	Mahogany Brown
	8017	RNS3-00011	Chocolate Brown
	8019	RNS3-00004	Grey Brown
	8025	RNS3-20011	Pale Brown
	8028	RNS3-20012	Terra Brown
	9001	RWS3-60004	Cream
	9002	RWS3-60002	Grey White
	9003	RWS3-00002	Signal White
	9005	RBS3-60004	Jet Black
	9010	RWS3-60003	Pure White
	9011	RBS3-60001	Graphite Black
	9016	RWS3-60001	Traffic White
	9017	RBS3-60002	Traffic Black

RAYCAP WORLDWIDE LOCATIONS

Raycap Inc.
806 South Clearwater Loop
Post Falls, ID 83854
United States of America

7555-A Palmetto Commerce Pkwy
North Charleston, SC 29420
United States of America

46 Sellers Street
Kearny, NJ 07032
United States of America

Raycap GmbH
Parkring 11
85748 Garching Munich
Germany

Raycap S.A.
Telou & Petroutsou 14
15124 Maroussi Athens
Greece

Raycap S.A. Manufacturing
Industrial Area of Drama
66100 Drama
Greece

Raycap d.o.o.
Poslovna cona Žeje pri Komendi
Pod hrasti 7
1218 Komenda
Slovenia

Raycap Cyprus Ltd.
46 Lefkosias Street
Industrial Area of Dali
2540 Nicosia
Cyprus

Raycap SAS
84 rue Charles Michels
Building B
93200 Saint-Denis
France

Raycap Corporation SRL
102, Barbu Vacarescu
entrance D, 4th flooor, D22,
020283 Bucharest
Romania

Raycap (Suzhou) Co. Ltd.
Block B, Phase II
of New Sea Union
No. 58 Heshun Road
SIP, Suzhou 215122
Jiangsu Province
China

Raycap

raycap.com • info@raycap.com

Products in this guide are examples of our offerings.
Please contact us for custom solutions.

InvisiWave, STEALTH and Strikesorb are registered trademarks of Raycap.

© 2022 Raycap All rights reserved.
G09-00-123 220317