PHILIPSTOWN
CELL SOLUTIONS

Honorable Chairman William Rice,
Special Counsel Todd Steckler,
Members of the Zoning Board of Appeals,
and Planning Board
Village of Nelsonville
258 Main Street Nelsonville, NY 10516

February 9, 2018

Dear Honorable Chairman William Rice,
Special Counsel Todd Steckler,
Members of the Zoning Board of Appeals,
and Planning Board:

Please find enclosed an initial survey of available technologies adopted by communities tasked with accommodating telecommunication expansion in areas of scenic beauty and historic importance.

As the following case studies demonstrate, technological innovation need not come at the expense of state-designated natural and historic resources such as ours that have been recognized as worthy of protection.

From DAS lampposts in the historic neighbourhoods of New Orleans, church steeples in New England, 4G directional antennas in rural Wales to Westchester County and other local Hudson Valley communities, alternative solutions exist *today* for communities willing to think creatively about how to preserve their special heritage.

Sincerely,

Philipstown Cell Solutions

When personal wireless service facility sites are smaller, they aren't as easily seen, even though there may be more of them. The Telecommunications Act of 1996 and State Law give localities the choice.

There are five different personal wireless service facility sites in this photosimulation. Although there may never be any sites in this area, they have been photosimulated to show how they can blend with the landscape. Albemarle County requires less visible and less intrusive solutions such as those shown here.

The built environment of Albemarle County contains many potential Opportunity Sites, or man-made sites for personal wireless service facilities such as rooftops and utility poles.

Opportunity Sites include those locations where existing structures provide siting for Personal Wireless Service Facilities. The placement, construction and/or modification of personal wireless service facilities within an Opportunity Site is encouraged.

Above is an example of an Opportunity Site. A personal wireless service facility is located in the steeple of the St. Paul Church in Ivy.

CASE STUDY

CROWN CASTLE

Bringing high-speed data to Central Park.

Due to its sheer size, expanding wireless coverage in New York's Central Park is particularly challenging. The park covers 843 acres, and dense foliage prohibited rooftop antennas around the perimeter from providing adequate coverage.

Working closely with several governing bodies, we installed fiber across the park and utilized existing infrastructure to deploy a state-of-the-art small cell solutions (SCS) network. This approach provided necessary voice and data coverage while blending in and maintaining the natural beauty of the park.

Challenges

Central Park averages over 100,000 visitors a day, and on a typical Saturday, that number regularly reaches 220,000.* In addition, the park is also host to large events including concerts on the Great Lawn and the finish line of the New York City Marathon. Providing the infrastructure to ensure that all these visitors have access to the voice and data services they demand comes with several unique challenges:

- The park is considered part of the city. Residents and guests expect their smartphones to work.
- For over 150 years, people have gone to great lengths to ensure that the park remains an oasis from the fast pace and urban feel of the rest of the city. Any new infrastructure couldn't disrupt the park's beauty and restful feeling.
- The needs and interests of several different stakeholders and governing bodies had to be weighed, including the Department of Information Technology and Telecommunications (DOITT), the Department of Transportation (DOT), the Central Park Conservancy, the Landmarks Preservation Commission, and the Department of Parks and Recreation.

The Solution

To meet the wireless demands of the many visitors who frequent the park, we settled on a fiber-based solution—giving us essentially unlimited capacity to build our SCS network. It is also a forward-looking solution, since future upgrades won't require installing additional cable. To preserve the park's natural beauty, we placed nodes on a variety of existing infrastructure, from streetlights to signposts—helping to maintain the park's main draw as a beautiful retreat in a bustling city. Like all the SCS networks we build, it's a neutral host solution, so all wireless carriers can take advantage of the new system without unnecessary infrastructure. With everything in place, Central Park now has the capacity to meet the voice and data needs of the many tourists and New York City residents.

SCS installation on Central Park streetlight.

WHY CROWN CASTLE?

We have nearly 15 years of experience implementing fiber and small cell solutions in communities of all kinds, from dense urban centers to residential neighborhoods.

Discreet, innovative technology

We provide shared infrastructure that gives you the wireless service you've come to depend on—all while blending in with your environment.

Scalable solutions

Our SCS are connected by fiber optic cable—making upgrades easy and enabling virtually unlimited future capacity.

Long-term commitment

Our business is all about infrastructure, and you can count on us to be here no matter how technology or carriers change.

* "Report on the Public Use of Central Park," *Central Park Conservancy*, 2011.

CROWN CASTLE

For more information, please contact (866) 482-8890 or visit CrownCastle.com

About Crown Castle

Crown Castle provides wireless carriers with the infrastructure they need to keep people connected and businesses running. With approximately 40,000 towers and 15,000 small cell nodes supported by approximately 16,000 miles of fiber, Crown Castle is the nation's largest provider of shared wireless infrastructure with a significant presence in the top 100 US markets.

The Foundation for a Wireless World.

CrownCastle.com

Rye, NY

Project Overview

Dating back to 1660, the city of Rye, New York has a unique blend of the old and new. Ripe with national landmarks and a historic past, Rye is a highly desirable suburban community. But with rising data demands, the city's current infrastructure is unable to provide reliable wireless service to its residents. With 48% of households relying exclusively on mobile phones, real estate agents across the country are saying that a dependable wireless connection is a key consideration when looking for a home.

We are proposing supplementing the wireless infrastructure in the area with a larger small cell solutions (SCS) network. With an SCS network, we'll be able to use a series of small, discrete nodes–connected by high-capacity fiber optic cable–to enable expanded carrier coverage and capacity.

As a licensed Competitive Local Exchange Carrier (CLEC) in the state of New York, we are able to place nodes in the public right-of-way, where most utility equipment is located. This minimizes the redundant infrastructure, allowing us to use existing streetlights and utility poles and reduce the number of new facilities needed.

We embrace a shared model to accommodate multiple wireless carriers on our fiber-fed network. This allows us to maximize coverage and capacity with the least amount of infrastructure possible.

In an effort to retain the residential character of Rye, Crown Castle has worked closely with the City Staff and Council and was unanimously approved by the Board of Architectural Review [on May 9, 2016] for a design that will blend into the landscape.

The challenges we're solving

We have over 15 years of experience implementing SCS in communities, including dense urban centers and residential neighborhoods. SCS provides many unique benefits, including:

- With the increased use of data-hungry apps and video, the SCS network will add much-needed capacity and relieve the congestion and strain put on existing towers in the area.

- With greater coverage and capacity, residents will have more reliable access to public safety and emergency services like 911.
- Our CLEC status and shared model help preserve neighborhood aesthetics by maximizing coverage and minimizing new infrastructure. By
- installing on streetlights and utility poles in the public right-of-way, we can give residents the coverage and capacity they need in the most unobtrusive way possible.

Proposed sites

The map below indicates existing and proposed sites where installations will be located on streetlights, utility poles, and slimline poles within city-owned sidewalks.

CASE STUDY

CROWN CASTLE

A small cell solution for a growing university.

As the University of Mississippi continued its substantial growth, it knew that an updated wireless solution would be needed to meet its current and future demands.

This was especially true at two of the most highly trafficked areas—the Rebel football stadium and a nearby tailgating spot called The Grove. Crowds were getting bigger and wireless usage was skyrocketing, making it clear that the current infrastructure would not be able to keep up with the expectations of students, faculty, and the many die-hard Rebel fans in the community. Crown Castle was brought in to provide a solution that would satisfy the needs of the many stakeholders.

Challenges

The stadium and The Grove were being covered by just a couple of nearby towers and rooftop installations. But as attendance at games started regularly reaching over 60,000, in addition to the 20,000+ students already on campus, the current infrastructure proved to be inadequate. The university needed new wireless infrastructure, and installing it came with some challenges:

- With the rise of smartphones and social media, the solution had to be capable of handling increasing data consumption during games.
- In a stadium built long before wireless technology was on anyone's radar, finding places to install equipment was difficult.
- The installation process couldn't interfere with normal stadium use during the season.
- The new solution needed to preserve the beauty and history of the campus, including The Grove.

The Solution

It was clear from the beginning that the solution would have to involve small cells—a newer technology that provides pinpoint coverage and capacity by using small, inconspicuous nodes placed closely together.

CASE STUDY

CROWN CASTLE

Expanding coverage while preserving beauty in Vail.

Vail, Colorado, is a picturesque community, famous for its beautiful mountains and ski slopes. That makes it a popular vacation destination for thousands of recreational travelers; however, the challenging topography surrounding the Village and residential neighborhood makes it especially difficult to provide reliable wireless coverage.

A few nearby towers and rooftop installations provided some coverage, but were inadequate to handle today's data demands. Upcoming local events, like the FIS Alpine World Ski Championships, were expecting up to 150,000 visitors—making it clear that an upgrade was necessary. We installed a small cell solutions (SCS) network that consists of several strategically placed nodes that accommodate multiple wireless service providers as well as the city's wi-fi and video-monitoring system. The network has improved wireless coverage and provided much needed data capacity to the Village.

Challenges

With all its peaks and valleys, Vail's difficult topography required careful planning to make sure each node was strategically placed to maximize coverage and deliver the needed capacity. This all had to be done in accordance with the town's strict aesthetic regulations and several layers of approval. To complete the project on time and on budget, we had to navigate these and other challenges:

- The network needed to be hardened to withstand adverse weather conditions
- The area needed enough capacity to accommodate the large crowds that visit Vail throughout the year
- We needed to balance different audiences' conflicting needs, aesthetic requirements, and technical radio frequency (RF) challenges
- All installation work had to be completed within very tight construction schedules

The Solution

To meet the voice and data demands of the visitors and residents of Vail, we designed and installed a fiber optic SCS network. Twenty-nine custom-designed slimline poles—similar in size and appearance to streetlights—were placed on public rights-of-way. Each node was strategically placed to maximize coverage and preserve the look and feel of the Village. We coordinated with various government stakeholders to obtain approval for the entire project during the design phase, which helped streamline the deployment process and keep the project on time and on budget. Vail residents and visitors now have access to a state-of-the-art 4G LTE network.

Supporting Public Safety

In support of the 2015 Alpine World Ski Championships, public safety officials and other stakeholders, led by the state of Colorado FirstNet team, wanted a wireless infrastructure solution in the Village that was capable of supporting 4G LTE applications to monitor activities during the event. We worked closely with the state of Colorado to set up a public safety network demonstration. The state secured rights to the FirstNet spectrum, and we provided four of our existing nodes to host equipment dedicated to the trial. The network demonstration enables officials to test applications in practical situations, including real-time video, push-to-talk, Voice over IP (VoIP), situational awareness, and others. The installation marks an important milestone, as it's the first SCS network to operate using 700 MHz Band Class 14 over the same infrastructure as a commercial Distributed Antenna System (DAS). The trial serves as a model for FirstNet in other states as they consider the various deployment options for the new Nationwide Public Safety Broadband Network (NPSBN).

Custom-designed slimline poles accommodate SCS nodes.

Nodes are strategically placed near roads and residential areas.

WHY CROWN CASTLE?

We have nearly 15 years of experience implementing SCS in universities and other communities, including dense urban centers and residential neighborhoods.

Discreet, innovative technology

We provide shared infrastructure that enables the wireless service you have come to depend on—all while blending in with your environment.

Collaboration

We involve residents in every major decision so everyone has a say in the solutions that are developed.

Local presence

We have offices nearby with people who understand your community—and its wireless coverage needs.

CROWN CASTLE

For more information, please contact (866) 482-8890 or visit CrownCastle.com

About Crown Castle

Crown Castle provides wireless carriers with the infrastructure they need to keep people connected and businesses running. With approximately 40,000 towers and 15,000 small cell nodes supported by approximately 16,000 miles of fiber, Crown Castle is the nation's largest provider of shared wireless infrastructure with a significant presence in the top 100 US markets.

The Foundation for a Wireless World.

CrownCastle.com

https://www.thinksmallcell.com/Rural/rural-small-cell-site-visit-in-west-wales.html

Rural Small Cell site visit in West Wales

Written by David Chambers.

EE has set itself the goal to expand geographic coverage throughout the UK. A key plank of that strategy is to install rural small cells to serve isolated communities. I visited three trial sites in Wales to understand how these systems have been installed and what impact they've made to the local population. Parallel Wireless who provided the equipment introduced me to local users and explained how the system worked.

Testing both different architectures and user profiles

Each of the three locations on west coast of Wales served a different user profile and each was designed to trial a different backhaul architecture. The common aspect was the integrated Parallel Wireless 3G+4G small cell in a secure cabinet. These were each installed in a single day, with a "cherry picker" used to fit the antenna to the side of a building. A single innocuous cylindrical antenna housing incorporates separate 3G and 4G directional antennas, typically with a 90 degree spread plus a GPS receiver for synchronisation. Some of the units only required mains power and used wireless links for backhaul. The others were directly connected to fibre backhaul. These are all live on EE's network, making calls and sending data, seamlessly handing over to/from the macro network. All the usual services and features are available and it is fully compatible with 3G and 4G smartphones – even older models.

Where wireline backhaul isn't available, it can be very efficient simply to relay the service from a nearby 4G macrocell. Line of sight transmission from the so-called "donor" macrocell using 4G uses higher modulation rates than a smartphone to achieve greater throughput from the same spectrum resource.

This is then "repackaged" to provide both 3G and 4G at the local sites. Using 4G for backhaul is less expensive that installing dedicated microwave links. Internal short range line-of-sight datalinks between local small cells use the 5GHz unlicensed band. Any site could be upgraded with wireline backhaul in the future if and when it becomes available and is cost effective to connect.

A welcoming community

The first notable aspect is that wherever we went, the local community were very pleased to have the service and couldn't do enough to help the engineers install and operate it. They certainly didn't view the system as an imposition; more of a release from the poverty of poor connectivity.

This is no accident. EE have deliberately selected communities that want to become involved rather than imposing a solution in locations with local opposition. Community champions have greatly assisted the projects with site selection, practical support on-site and communicating details to those who will benefit.

The forgotten village

Llanddeiniol is a small village tucked away in a valley just a few miles off the main road. Mobile phone calls used to involve a steep walk up to the top of the nearest hill. Wireline broadband over ADSL here is a far cry from the tens of megabits many have become used to in our towns and cities, with typical rates of 1 Mbps down and 0.1 Mbps up.

Jon Parker, who works from home, was very enthusiastic about the project. Not only did he provide the site for the small cell but he also dug out a 230 metre trench along the side of his field for the fibre backhaul and power cables connecting a receiver located on a telegraph pole. That has direct line of sight to the donor macrocell peeking out behind a hilltop far down the valley.

Quite apart from enabling him to work from home more effectively, he also felt this was one way to “give back” something to his local community. His neighbours include farmers and doctors, who all benefit from ubiquitous cellular service where before there was none.

The Holiday Home

While some like to enjoy being off-grid during their holidays and weekends away, life for many requires being constantly connected. Indeed, it can enable a more flexible lifestyle with more time spent away from the office. This has led to greater demands for good Internet and mobile coverage in holiday areas.

The very scenic and modern holiday village at Tresaith did have some 4G coverage from a distant macrocell, but most of the village was masked by a headland and there was no 3G service at all. A carefully positioned interlink site received the 4G signal and rebroadcast this as 3G throughout. It also relayed the signal to a second site installed on a holiday home further up the valley, which distributed 3G and 4G cellular service around it.

[View from the interlink site towards the donor macro, and of the village from the interlink site]

[Discretely hidden, the directional antenna is well positioned for village coverage while the rectangular receiver antenna has a good view of the donor macro]

The owner of the holiday park has been very pleased with the system and the reliability of coverage throughout. He no longer misses calls when away from his desk and can respond directly at any times. Once word gets out, I'd be surprised if bookings aren't up for the year ahead.

The Industrial Airport

The old RAF base at Llanbedr has been acquired for civilian use. It aims to become a hotbed of aviation research and development, already hosting drone testing, and is seeking to become a launchpad for future space travel. As with many airfields, there is an estate with a range of offices and related industrial units for rent. Cellular service was barely available before but is clearly an essential item for today's businesses.

[A single site at the main airside gate provides coverage to many buildings spread out across the industrial park, which is at the early stages of redevelopment]

The site had fibre broadband installed as part of recent infrastructure investment. Three small cells have been installed across the airfield, all with direct fibre backhaul and all providing both 3G and 4G service.

[Llanbedr Control Tower and office complex, served by a dedicated small cell opposite]

The deputy airfield manager was upbeat about the new service. It's made his life an awful lot easier and clearly differentiates EE from other networks in the local area.

A cookie cutter approach

Although the end users and backhaul choices varied between these three sites, they all shared the same common equipment and installation format. A single cabinet on the ground fed by mains power with cabling to a single rooftop level antenna. Installation typically took a day. These initial trial deployments have allowed EE to refine and streamline their standard deployment and configuration procedures. In these remote areas, there is little opportunity to interfere with or affect the existing macrocell coverage. Site maintenance visits can be costly in these remote areas, so local technicians such as electricians or satellite TV installers have been co-opted for ad-hoc local support. This avoids the need to send specialists from far away. Remote diagnostics, robust and resilient equipment design together with thoughtful design of siting helps minimise ongoing maintenance issues.

Vodafone Rural Open Sure Signal programme

https://www.vodafone.co.uk/explore/network/what-affects-your-coverage/rural-open-sure-signal/index.htm

Connecting Cranborne: The story behind fixing a notorious not-spot

By Adam Bunker - 09 April 2013

Cranborne in Dorset has a problem: the lie of the land means it's been without mobile signal for as long as the community can remember. But not any more...

Stories like that are why David Blake and the residents of Cranborne, a small village in Dorset, are thrilled to have the benefits of a Vodafone mobile phone signal for the first time. The village has become one of the first in our pioneering trial to bring mobile reception to a select bunch of the UK's most notorious 'not-spots', so we popped down for a chat with some members of the community to find out how things have changed.

How do you inject mobile signal into a place where it's never been before? Read on to find out.

Making a case

"I got a text while I was in here on my phone on Monday," says David, (the community's mobile champion and Project Development Officer for Cranborne Chase and West Wiltshire Downs) as we're sat in the local pub. "That's the first text I've had here for probably two years." That's because Cranborne, like some other rural areas of the UK, has historically been a black hole when it comes to mobile reception.

"The village has been a not-spot for mobile phone communications since the last ice age," he jokes. "Not-spots are incredibly hard to deliver services to. They're really resistant to change because they're normally caused by geography." Cranborne's no different; it sits in a geographical basin, which makes it impossible for signal to hit home through regular means. And that's exactly why it made the perfect candidate for our open femtocell trial.

Let there be signal

Thankfully for a designated 'Area of Outstanding Natural Beauty' such as this, theopen femtocell masts now dotted around Cranborne are so subtle that you'd easily miss them if you weren't trying hard to spot them.

There are five in total, affixed to the roofs of one of the local pubs, a restaurant, the garden centre, the sports centre and the village hall. These tiny antennas share signal duties between each other and, together, mean that Vodafone customers should get a signal when they're out and about Cranborne.

New Orleans
Historic District

New Orleans
Historic District

New Orleans
Historic District

Figure 17. Crown Castle small facility deployed in historic French Quarter in New Orleans, LA[17]

Figure 18. Crown Castle small facility deployed in historic Pittsburgh, PA[18]

Figure 19. Crown Castle small facility deployed on Central Park West, just outside of the historic Central Park in New York City, NY[19]

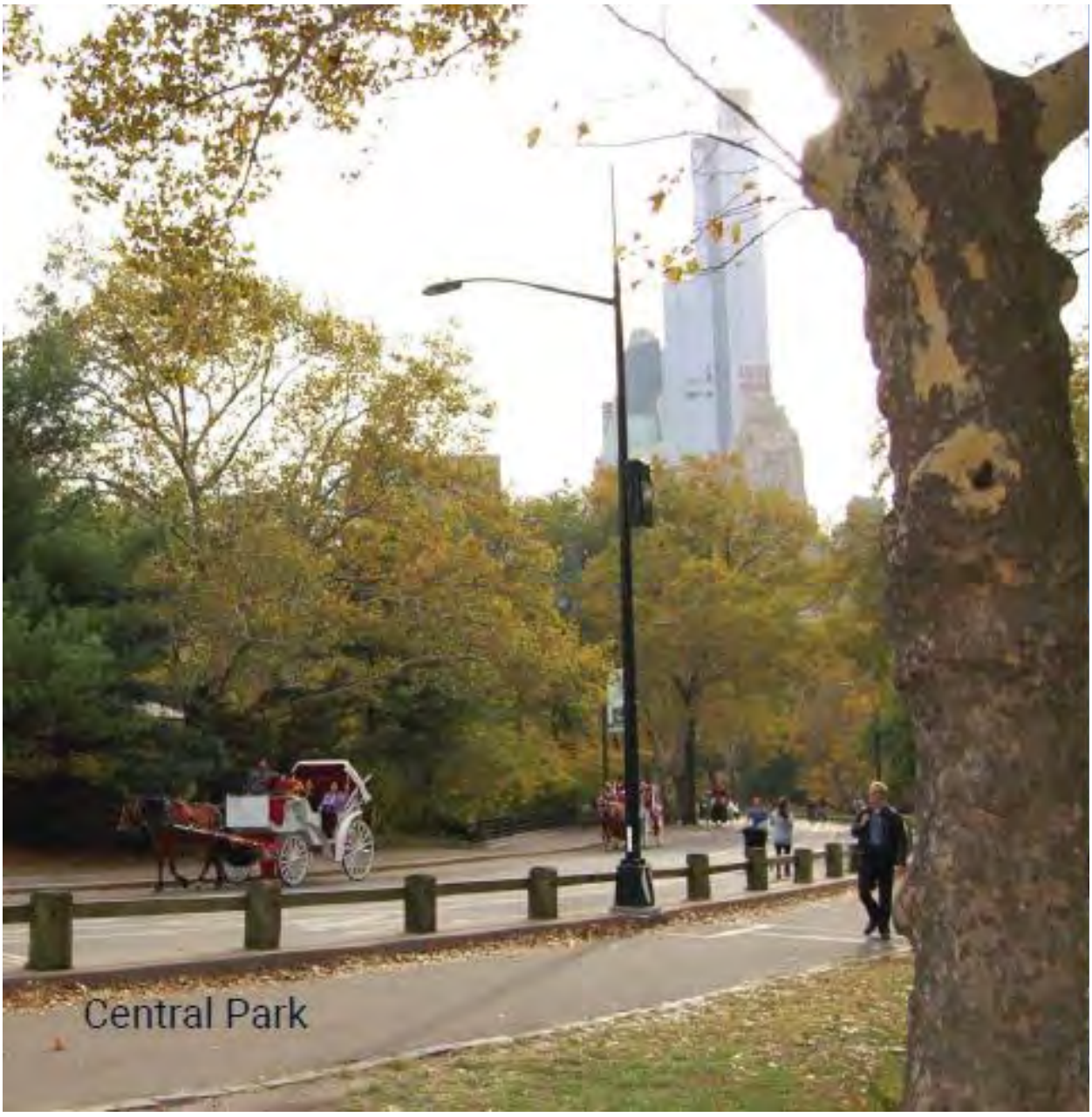


Figure 20. Crown Castle light pole-mounted small facility deployment in historic Central Park, New York.[20]

Figure 21. AT&T stealthed small facility deployment at the Dallas Arboretum.[21]

Figure 22. AT&T stealthed small facility deployment at Dallas Arboretum.[22]

STEALTH®
GO UNNOTICED™

SMALL CELL SOLUTIONS

3034-A ASHLEY PHOSPHATE RD. | N. CHARLESTON | SC | 29418 | 800.755.0689 | stealthconcealment.com

Small Cell Concealments

Are you in need of a small cell concealment solution that hides with pride? Look no further!

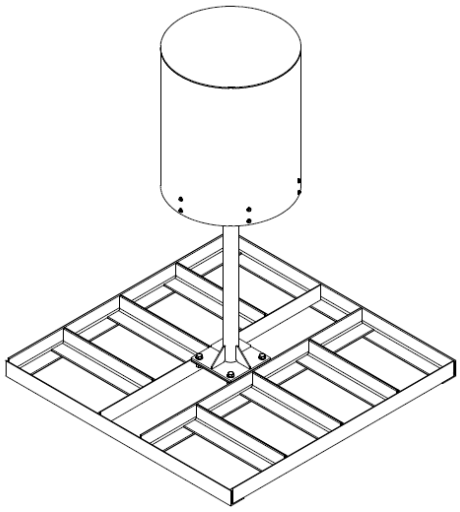
With the demand of bandwidth increasing, small cell sites have become key to keeping the public connected. STEALTH® once again has taken the lead in developing small cell solutions all across the country to include residential and commercial locations.

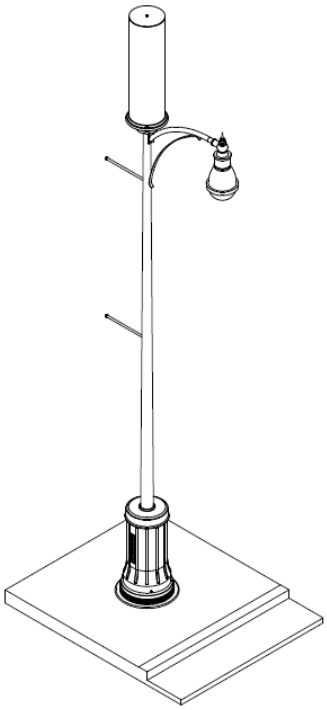
We know that aesthetics are especially important to historic districts, campuses, and downtowns alike. Armed with years of experience, we honor the heritage of every small cell location while also ensuring excellent RF signal. All of our designs are completed with your requirements in mind.

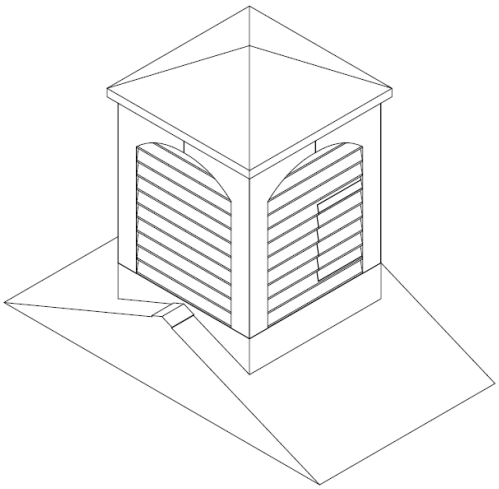
STEALTH designs, engineers, and fabricates interior small cell systems in addition to exterior sites. We can create just about anything your imagination can dream up, including, but not limited to:

- Chimneys
- Light Poles
- Rooftop Pods
- Cupolas

Regardless of the solution you choose, we make sure to keep your small cell sites Out of Sight, Out of Mind™! Check out a few examples of past small cell projects on the following pages.







APPLICATION: Roof Attached Chimney | **LOCATION:** Sarasota Springs, New York
DESCRIPTION: 3’ wide, 6’ tall, 2’ deep

APPLICATION: Chimney Pot | **LOCATION:** Sarasota Springs, New York
DESCRIPTION: 3’ tall, 1’ - 9” O.D.

APPLICATION: Ballasted Chimney | **LOCATION:** Frederick, Maryland
DESCRIPTION: 2' wide, 3' tall, 4' deep

APPLICATION: Grid Assemblies | **LOCATION:** Silver Spring, Maryland
DESCRIPTION: 4’ wide, 9’ tall

APPLICATION: Rooftop Cupola | **LOCATION:** Eldersburg, Maryland
DESCRIPTION: 3’ square, 6’ tall

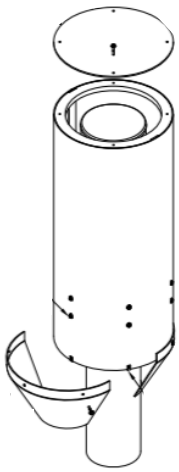
APPLICATION: Lanterns | **LOCATION:** Washington, D.C.
DESCRIPTION: 2’-8” tall, 2’ O.D.

APPLICATION: Custom Pole Options

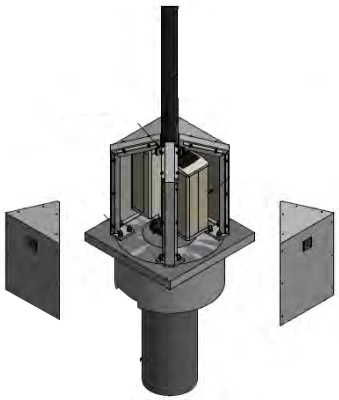
DESCRIPTION: Fully customizable (including pole, base, access doors, equipment, lights, etc.)

APPLICATION: Light Poles | **LOCATION:** Pittsburgh, Pennsylvania
DESCRIPTION: 30' shown - fully customizable (including pole, base, access doors, equipment, lights, etc.)

APPLICATION: Banner/Light Poles | **LOCATION:** University, Mississippi
DESCRIPTION: 25' shown - fully customizable (including pole, base, access doors, equipment, lights, banners etc.)



APPLICATION: StealthSkin™ Topper | **LOCATION:** Sewickley, Pennsylvania
DESCRIPTION: 8' tall radome shown, available in a 18" diameter and up to 12' tall with a min. pole size of 5" and max. pole size of 14"



APPLICATION: STEALTH® Base Cabinet Enclosure

DESCRIPTION: fully customizable (including size, shape, color, ventilation, etc.)

**patent pending*



Church Concealments

Are you looking for a concealment that will also help you bring financial strength to your organization? Look no further!

Congregations across the nation are taking full advantage of the financial benefit of having wireless antennas installed on their property.

STEALTH® offers a wide variety of church solutions - from steeples to louvers, to windows, crosses and more. Your concealment options are limitless! All of the materials we use are RF-transparent, which means excellent RF performance and quick installation. Whether you are looking for a traditional steeple, or a completely custom concealment, we've got a solution for you!

Already have a concealment on your church property that you're looking to expand or upgrade? No problem!

The STEALTH Team has years of expertise with replacements, extensions and expansions. Our concealments grace elaborate steeples in Massachusetts, beautiful stained glass windows in Los Angeles, and numerous custom towers in between! If it's crosses or bells you're after, we can do that too!

Church concealments share many elements with the other types of concealments we offer, however, every site is different, and STEALTH embraces each and every custom job. Sometimes this may mean an increase in cost, but we're happy to work with any budget. We have the ability to create something that hides multiple antennas while maximizing the beauty of any church. Contact us today to begin increasing your wireless signal and the aesthetics of your property.

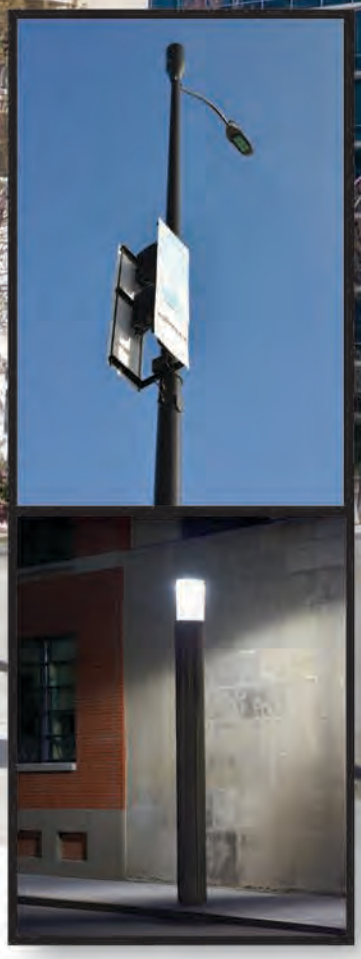
Zoning	Expandability	Site Prep	Installation Time	Maintenance
MOST	HIGH	HIGH	MEDIUM	MEDIUM

STEALTH GO UNNOTICED™

3034-A ASHLEY PHOSPHATE RD. | N. CHARLESTON | SC | 29418 | 800.755.0689 | stealthconcealment.com

valmont
STRUCTURES

Small Cell Poles



Valmont Structures Provides Small Cell Pole Solutions for Outdoor Coverage.

Our unrivaled expertise in lighting, traffic, and wireless structures allows us to provide to the marketplace the most extensive selection of designs and materials for small cell sites.

Any new structure has the potential to become a small cell site. Valmont provides small cell solutions for outdoor coverage using the same materials and design criteria found in our lighting structures. With our vast catalog of Valmont light poles, we are best positioned to match and convert your needs into new small cell sites.

When beginning a custom project, our technical team will carefully consider all project specifications and the surrounding environment. Our recommendations are unique based on local permitting and zoning requirements, pole size and location.

- Unparalleled fusion of engineering expertise in lighting, traffic and wireless communication structure design
- Engineered to visually complement adjacent architectural and historical elements
- Variety of materials available - including steel, aluminum and fiberglass/composite
- Variety of finishes available to match existing structures

Request information on Valmont small cell pole solutions. Visit us online at **valmont-towers.com**.

TMP8295 03/17

CONCEALFAB 13” FLUTED MONOPOLE
SAVANNAH, GEORGIA

ConcealFab® Corporation

INTRODUCTION

ConcealFab Corporation's solution portfolio of infrastructure products includes a full line of integrated poles, antenna mounting solutions, radio cabinets / shrouds, replacement light poles and custom concealments (e.g., Stadium Signage and Lightennas). These pre-engineered infrastructure solutions are some of the most innovative and easy to deploy products available on the market today.

We have evolved our solution portfolio to focus on products that improve a carrier's Signal-to-Interference-plus-Noise ratio (SINR). ConcealFab's signal-enhancement products facilitate densification of DAS and Small Cell nodes by helping expedite zoning approvals with structurally sound, yet aesthetically pleasing product solutions.

INTRODUCTION

ENGINEERING EXCELLENCE

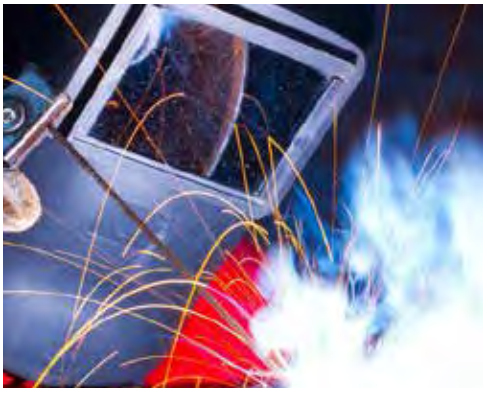
- Maximum RF Performance
- Superior Thermal Performance
- Designs prioritize both aesthetics and constructibility

DEEP INDUSTRY RELATIONSHIPS

- Direct access to OEM technical experts
- Experience meeting the needs of municipal stakeholders
- Products are approved by multiple carriers

SUPERIOR MARKET KNOWLEDGE

- Nationwide Market Perspective
- Full understanding of node deployment life-cycle
- Experts in cellular, power, and fiber systems



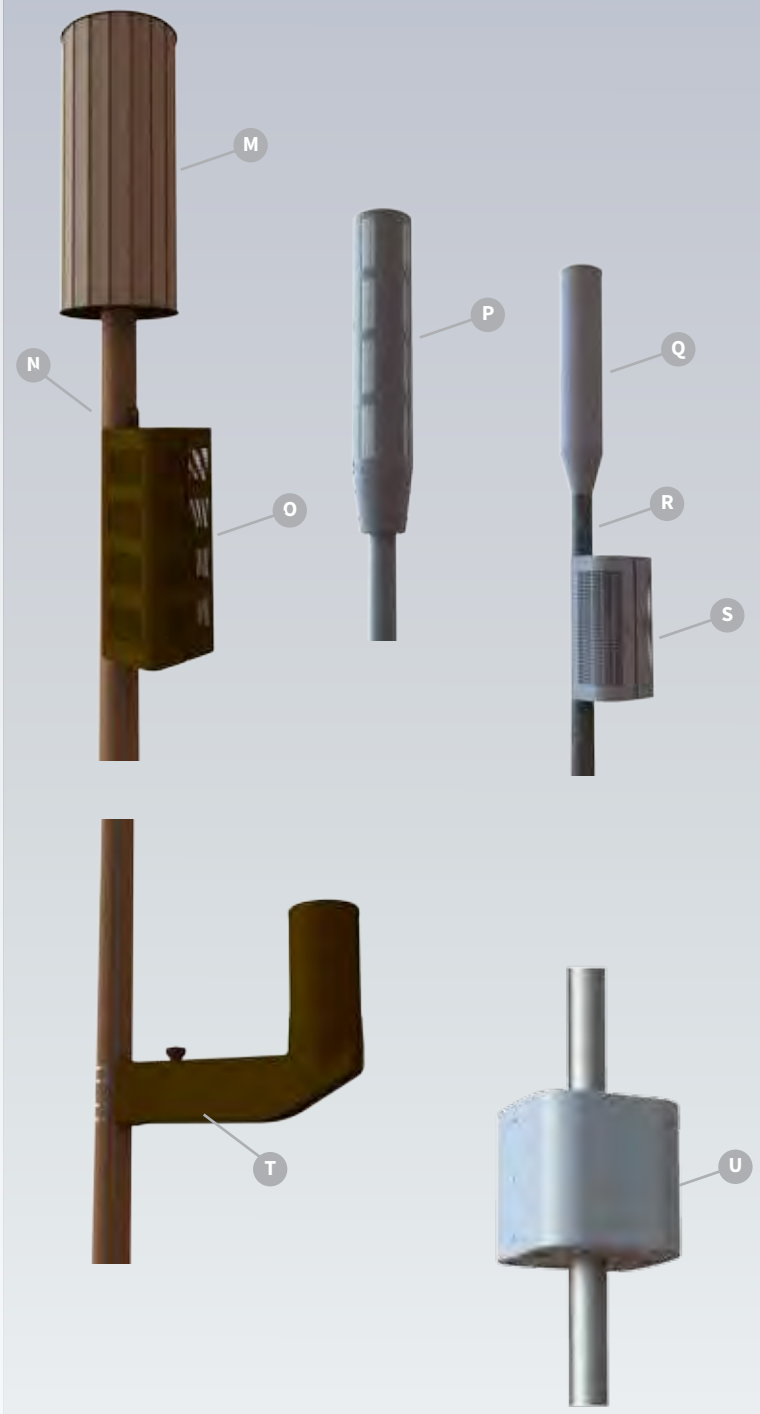
SCALABLE MANUFACTURING

- Agile and Lean Manufacturing practitioners
- One-hundred thousand square feet of in-house production capacity
- Rapid prototyping capability

PORTFOLIO OVERVIEW

ANTENNA MOUNTS

RADIO & ANTENNA SHROUDS



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PORTFOLIO OVERVIEW

INTEGRATED RADIO POLES

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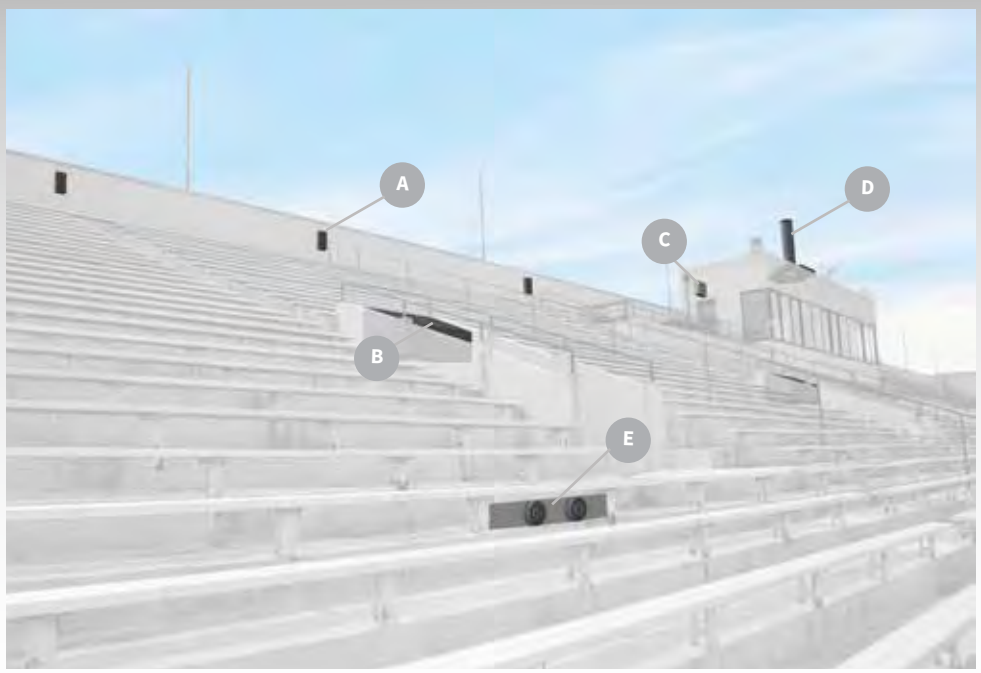
VENUE CONCEALMENTS



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ANTENNA MOUNTS

Heavy Duty Mounting Options

HEAVY DUTY

ConcealFab manufactures a wide variety of mounting solutions for the quasi-omni "cantennas" commonly deployed at multi-band small cell and oDAS sites. Mounting kits with optional cable concealment shrouds are available to securely attach these larger wind load antennas to existing wood, metal or concrete poles as well as to other structures. ConcealFab's "cantenna sleeve" design enables each mount to support a variety of antenna models, eliminating the need for a different mounting kit for each brand of antenna.

ConcealFab's mounting solutions include our proprietary PIM Kote™ finish to minimize passive intermodulation (PIM.)

Specifying a complete mounting solution requires multiple part numbers:

1 – Cantenna sleeve

2 – Mount

3 – Shroud (optional)

Optional Cable Concealment Shroud

Standard Cantenna Sleeve
Refer to Page 7 for Details

Cantenna Gimbal Sleeve
Refer to Page 7 for Details

Standard Mount
Refer to Page 9 for Details

Wide Diameter Mount
Refer to Page 10 for Details

Side Arm Mount
Refer to Page 11 for Details

Wood Post Mount
Refer to Page 13 for Details

Pole Top Extension
Refer to Page 13 for Details

ANTENNA MOUNTS

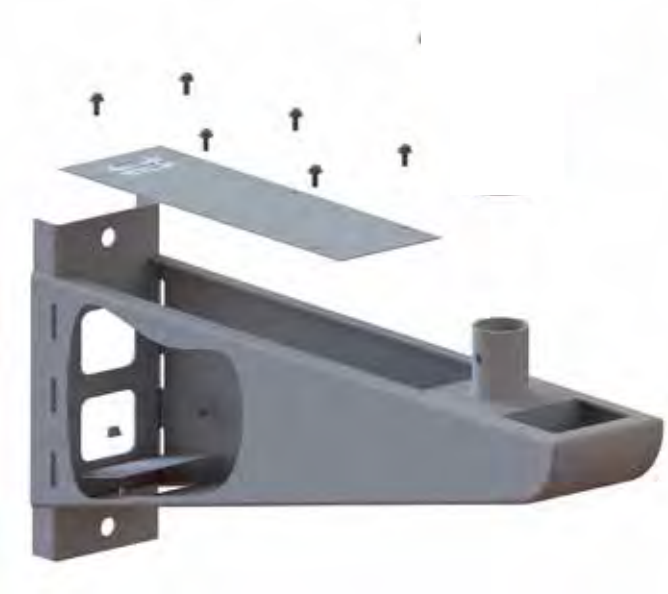
Side Arm Mount

HEAVY DUTY

PN - 007956-F (Bracket)

F = Finish Code	
1	Black
2	Brown
3	Gray
4	Silver

ConcealFab's heavy duty side arm mount is designed to attach an antenna to the side of an existing pole or structure. These mounts are engineered to support the sail area of typical 24 inch tall, multi-band small cell / oDAS antennas in extreme exposure zones. RF cables, splitters and diplexers can be concealed inside the arm, exiting either into the pole or to the outside surface of the pole. An optional cable concealment shroud is available to hide the RF feed-line connections from public view. Order sleeve separately.



PN - PPPPPP-F (Shroud)

PPPPPP = Base Part #	
007957	Amphenol
	Kathrein
	JMA
	Galtronics

F = Finish Code	
1	Black
2	Brown
3	Gray
4	Silver

ANTENNA MOUNTS

Universal Side Arm Mount

LIGHT DUTY

PN - 007457-AABCC

AABCC = Finish Code	
01204	Black
02104	Brown
03504	Gray
04204	Silver

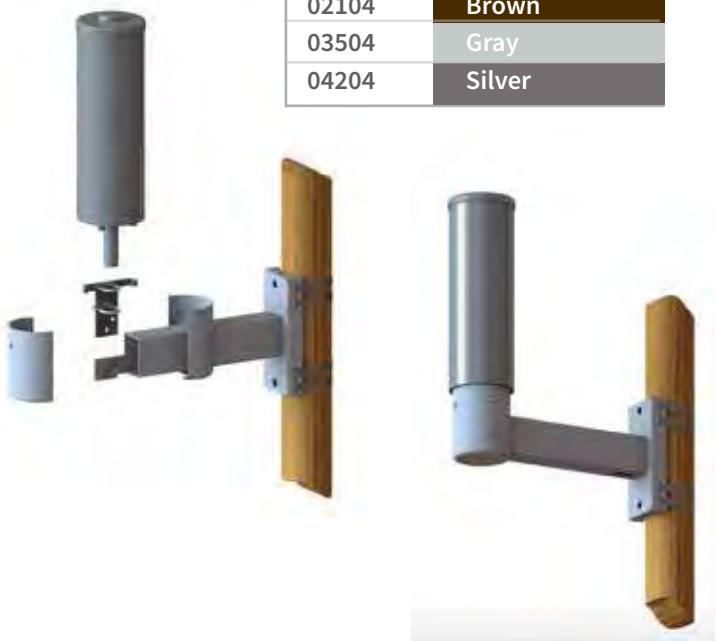
APPLICABLE ANTENNAS	
1	**Alpha** Alpha AW3477-S Quasi OMNI Antenna
2	**CCI** CCI SCA-OM- 360Fxx-Q-H2 OMNI Antenna
3	**Kathrein** 80010126 OMNI Antenna

ConcealFab's Antenna Side Arm Mount is designed to mount to a variety of low wind load cylindrical antennas to the side of a 4 inch minimum outside diameter pole. The mount can either be steel banded or bolted to the subject pole. A cable concealment shroud is included with the mount to hide RF cables from public view.

CCI Antenna Side Arm Mount

PN - 007709-AABCC

AABCC = Finish Code	
01204	Black
02104	Brown
03504	Gray
04204	Silver



The CCI Antenna Side Arm Mount is designed to mount the CCI SCA-OM-360Fxx-E-H2SG-K antenna to the side of a 4 inch minimum outside diameter pole. This mount is designed to meet cities with 28" max height restriction. The outside edge of the CCI antenna is offset 24" from the subject pole. The mount can be either steel banded or bolted to the subject pole. A cable concealment shroud is included with the mount to hide RF cables from public view.

ANTENNA MOUNTS

Pole Top Extensions

ConcealFab offers a variety of pole top extensions to increase the antenna RAD center above the top of an existing pole. Pole top extensions may be required for safety reasons at power line sites or to improve coverage / reduce PIM when luminaires are positioned close to the top of an existing pole. Order sleeve separately.

HEAVY DUTY

PN - 007960-H-F

H = Mast Height	
1	3’
2	4’
3	5’

F = Finish Code	
1	Black
2	Brown
3	Gray
4	Silver

- 5.25 to 14.12 inch outside pole diameter.
- For typical 24 inch tall, multi-band antennas in extreme exposure zones.

LIGHT DUTY

PN - 007962-H-F

H = Mast Height	
1	3’
2	4’
3	5’

F = Finish Code	
1	Black
2	Brown
3	Gray
4	Silver

- 3.25 to 6.63 inch outside pole diameter.
- For smaller sail area antennas

Wood Post Mount

HEAVY DUTY

PN - 007961-H-F

H = Mast Height	
1	1’
2	2’
3	3’

F = Finish Code	
1	Brown

ConcealFab’s wood post mount provides a convenient way to attach a small cell antenna to an existing wooden structure. The mount is bolted to an existing 4-inch nominal (3.5-inch actual) wooden member and is available with a variety of mast lengths to place the antenna RAD center at the required elevation. Order sleeve separately.

RADIO & ANTENNA SHROUDS

Overview

RADIO SHROUDS

- Multiple Shroud Sizes Available
- Smallest Footprint Available
- Thermally Approved or Compliant

ANTENNA SHROUDS

- Multiple Shroud Sizes Available
- Custom Antenna Mounting Hardware to Minimize Size
- Diplexers and Combiners Can Be Mounted Within the Shroud

COMBINATION SHROUDS

- Designed to House Both Radios and Serving Antenna
- Cables are Hidden Inside the Shroud
- Shrouds are Vented for Radio Thermal Management

REPLACEMENT LIGHT STANDARDS

- Designed to Aesthetically Match Existing Poles
- Integrated Antenna Mounting Provisions
- Cables are Hidden Inside the Pole

RADIO & ANTENNA SHROUDS

Clamshell Radio Shroud

The ConcealFab Clamshell Radio Shroud is designed to enclose a small cell radio and various power equipment. The shroud attaches around existing light poles to ease installation and light pole replacement requirements. This shroud also features aesthetic details to alleviate permitting issues.

Dual Support Unit (Dual SUP) Sunshield

ConcealFab's Dual Support Unit Sunshield is designed to shroud a single Ericsson 220x radio Dual Support Unit. This shroud hides the radio equipment and associated cables, giving the node a cleaner aesthetic. The shroud mounts directly to the Dual Support Unit. This shroud is available in various paint finishes.

Mechanical Specifications

- 24.9'' Height x 8.2'' Width x 5.6'' Depth
- Weight: 1.6 pounds (Shroud Only)

RADIO & ANTENNA SHROUDS

Single Mast Pole Top Shroud

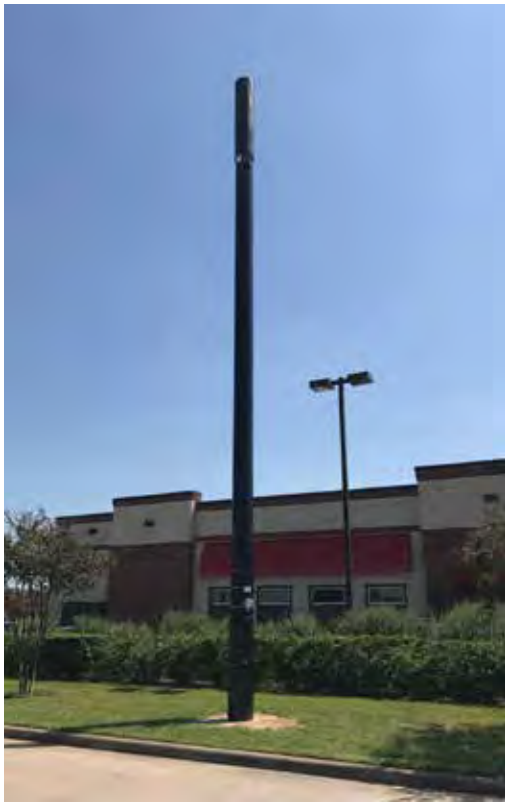
ConcealFab's family of Single Mast Pole Top Shrouds can be easily customized to meet operator requirements. Standard shroud outside diameters include 24, 30 and 36-inch in heights ranging from 3-FT to 8-FT tall. Custom mounting brackets to support ancillary equipment such as diplexers, splitters and grounding bus bars inside the shroud can be provided. The Single Mast Pole Top Shroud can be attached to existing poles ranging from 4.0 to 15.75 inch outside diameter or bolted directly to the top of new poles. Custom antenna mounting hardware is available enabling antennas to be mounted in the smallest diameter shroud possible. Transition shrouds are available to hide the mounting brackets and provide an aesthetically pleasing transition to the pole outside diameter.

Tri-Mast Pole Top Shroud

ConcealFab's Tri-Mast Pole Top Shroud provides maximum flexibility for operators deploying multiple panel antennas at small cell / oDAS sites. This 30-inch outside diameter shroud is available in 6-FT and 8-FT lengths. The shroud is large enough to enable +/- 15° independent azimuth adjustment per sector with typical 65° beam width multi-band antennas. This unit can be deployed with a single array of high gain antennas or in a multi-operator configuration with stacked low gain antennas. The Tri-Mast Pole Top Shroud can be attached to existing poles with outside diameters ranging from 8.25 to 15.75 inches or bolted directly to the top new poles. Custom, PIM friendly antenna mounting hardware is available. Please contact ConcealFab Customer Service for additional information. Transition shrouds are available to hide the mounting brackets and provide an aesthetically pleasing transition to the pole outside diameter.

RADIO & ANTENNA SHROUDS

14'' and 18'' Diameter Pole Top Shrouds



ConcealFab's 14'' and 18'' Pole Top Shrouds are designed to enclose the radio and antenna equipment of a site. An antenna, radio(s), and power disconnect panel can also be located within the same shroud. Placing the radio equipment close to the antenna reduces cable losses for lower-powered radios. The shroud includes a stainless steel internal structure with an eccentric mounting pipe to provide maximum volume for mounting radio equipment below the serving antenna. Radio equipment is kept cool by perforated vents. Mounting provisions include legs to attach to existing wood/steel poles or custom flanges to fit replacement poles. The shroud legs are designed to attach to poles between 4" and 14" in diameter.

RADIO & ANTENNA SHROUDS

Replacement Light Standards

When an existing pole is unable to support the added load of wireless equipment, ConcealFab's Replacement Light Standards are a perfect solution. These aesthetically pleasing designs incorporate convenient mounting for small cell / oDAS antennas and external radio shrouds. Structural accommodations can also be made for road signs, pedestrian crosswalk signs and banners.

ConcealFab's Replacement Light Standards can be designed to accommodate various quasi-omni antennas. The poles can be produced in a variety of shapes and sizes and outfitted with luminaires, as required, to match existing infrastructure. ConcealFab's Replacement Light Standards are hot dip galvanized for environmental protection and can be painted to meet jurisdictional aesthetic requirements.

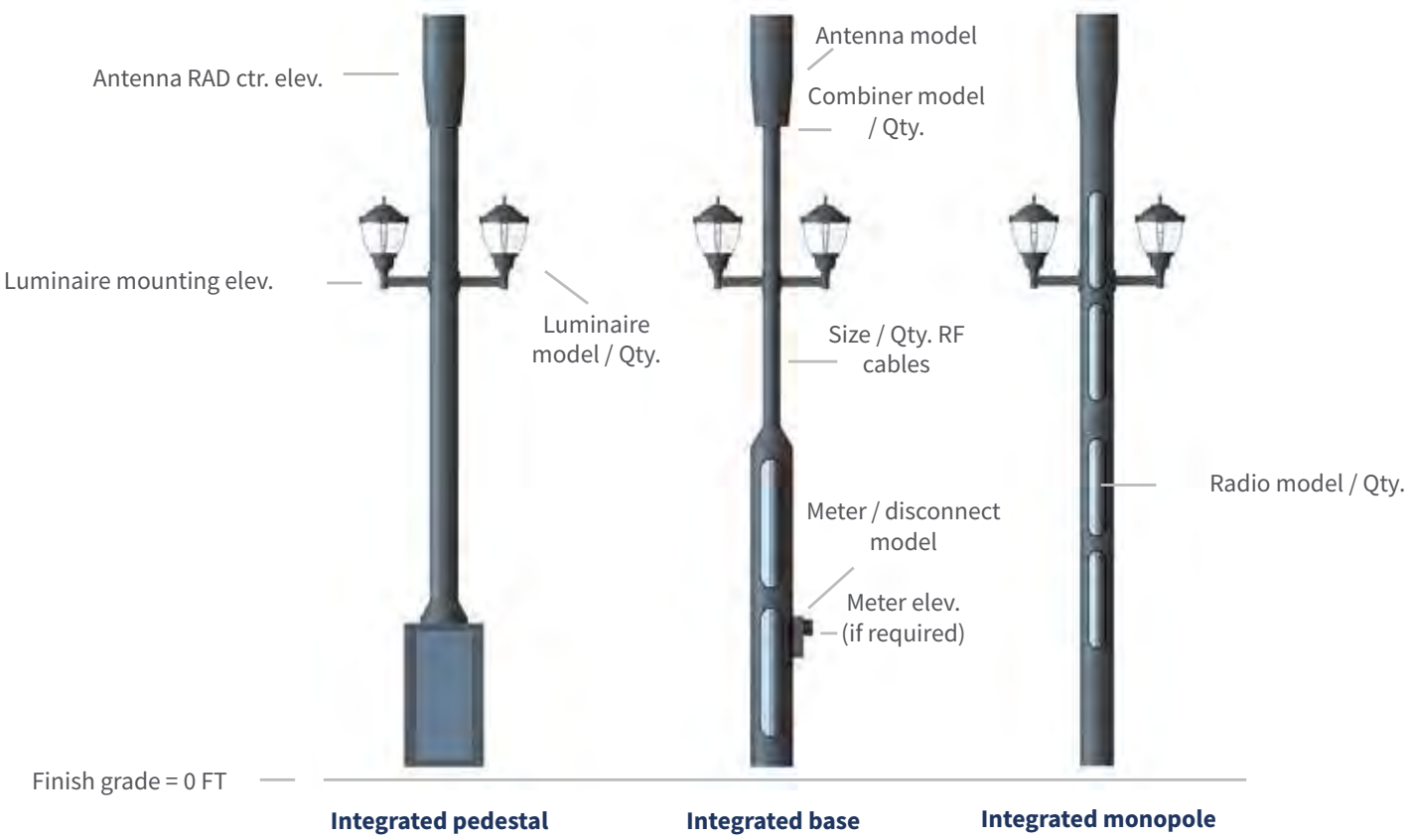
Heavy duty replacement poles are also available to support panel antenna shrouds. Paired with one of ConcealFab's Single Mast or Tri-Mast Antenna Shrouds, this system provides maximum flexibility to optimize RF performance. With RF feed-line cables and antennas hidden from public view, these systems often gain quick approval in urban / suburban environments.

RADIO & ANTENNA SHROUDS

LIGHT STANDARD TYPES

	**Smooth, tapered**	Classic light design. Typically used in residential areas and for area lighting with cobra light heads. Typically made of aluminum or steel.
	**Square section**	Typically used in parking lots. Typically made of aluminum or steel.
	**Hexagonal, tapered**	Typically used in residential and downtown areas. Typically made of aluminum or steel.
	**Octagonal, tapered**	Typically used in residential and downtown areas. Typically made of aluminum or steel.
	**Fluted, tapered**	These poles are decorative street lights. Typically used in historically sensitive Main Street USA areas. Typically made of aluminum or steel. Also made using wrought iron in historic areas.
	**Spun Concrete**	These poles are decorative street lights. Typically used in historic and affluent areas. Also used near oceans due to environmental considerations.

INTEGRATED RADIO POLES



Define Color

- Galvanized
- Customer Defined Color

SEND TO CONCEALFAB

ConcealFab® Corporation

ConcealFab Proposal

- Approval Drawing
- DXF
- Photo Simulation
- Lead Time

INTEGRATED RADIO POLES

12” Integrated Radio Monopole

KEY FEATURES

- **Mimics the look of a traditional light standard**
- **Luminaire and luminaire arm can be configured to match the adjacent poles**
- **Smallest footprint available for low-wattage radios**
- **Minimal RF Cable Losses**

The most compact of ConcealFab’s line of Integrated Radio Poles, the 12” Integrated Radio Monopole is able to accommodate a variety radio configurations. The radio compartments within the pole can house Ericsson 2203/2205 radios, Nokia cMRO radios, Nokia AirScale Micro radios, or Commscope ION-M oDAS radios. Due to the small diameter, these poles are typically deployed in a monopole configuration with multiple radio compartments supporting multi-band / multi-operator deployments in locations that have demanding zoning requirements.

INTEGRATED RADIO POLES

13” Fluted Integrated Radio Monopole

KEY FEATURES

- **Matches the look of decorative light standards in downtown and historic areas**
- **Decorative bases are available to match the adjacent poles**
- **Luminaire and luminaire arm can be configured to match the adjacent poles**

ConcealFab’s 13” Fluted Integrated Radio Monopole includes a fluted profile to better match the more decorative and ornate light poles often found in city environments. The radio compartments within the pole can house Ericsson 2203/2205 radios, Nokia cMRO radios, Nokia AirScale Micro radios, or Commscope ION-M oDAS radios. These poles are typically supplied as a single-piece monopole with multiple radio compartments per pole. Decorative clamshell bases are available to conceal the anchor bolts and match existing poles in the area.

INTEGRATED RADIO POLES

17'' Fluted Integrated Radio Monopole

KEY FEATURES

- **Can be deployed as a multi-tenant structure**
- **Matches the look of decorative light standards in downtown and historic areas**
- **Decorative bases are available to match the adjacent poles**
- **Luminaire and luminaire arm can be configured to match the adjacent poles**

ConcealFab's 17" Integrated Radio Pole provides a fluted profile able to accommodate larger oDAS radios such as JMA / Teko and Commscope ION-ML. A fluted profile is often required to more closely match the more decorative and ornate light poles often found in city environments. This system can be deployed as a continuous diameter monopole but is more frequently deployed as an integrated base with smaller diameter extension pole. Decorative clamshell bases are available to conceal the anchor bolts and match existing poles in the area.

INTEGRATED RADIO POLES

20'' Octagonal Integrated Radio Monopole

KEY FEATURES

- **Most Flexible Equipment Platform**
- **Capable of being deployed as a multi-tenant structure**
- **Able to house traditional macro radios**
- **Luminaire and luminaire arm can be configured to match the adjacent poles**

ConcealFab's 20" Octagonal Integrated Radio Pole can accommodate the larger, high-power RRUS radios from Ericsson or RRH radios from Nokia, as well as, multiple modular oDAS radios from Solid, ADRF and Commscope (PRISM). The octagonal pole can be supplied with an optional power section below the radios to enclose a rectifier and back-up batteries. The octagonal is always deployed in the integrated base configuration with a smaller diameter extension pole supporting the antenna and any required light arms.

INTEGRATED RADIO POLES

24'' and 30'' Pedestal Bases

KEY FEATURES

- **24'' and 30'' footprint sizes to match equipment configuration**
- **Various heights to match equipment configuration**
- **Can be deployed as a base or a ground furniture cabinet**
- **Flexible mounting platform for multiple radios**
- **All sides are removable for easier installation and maintenance**

ConcealFab's Pedestal Bases are a highly flexible alternative for deploying a variety of oDAS and small cell radios in urban environments. The vented square base can accommodate multiple small cell and oDAS radios with only minor changes to mounting hardware. As radio requirements change, this system can be easily modified to accommodate new deployment needs. Large, removable side access panels provide maximum access to internal equipment during initial installation and service.

Lightenna™ Concealment

ConcealFab's Lightenna™ concealment is an ideal solution for locations with stringent architectural requirements. Each concealment encloses an existing small cell cantenna behind an RF transparent, frosted plastic shroud. Two LED illumination rings, tested to verify low PIM performance, are available to provide decorative lighting. Multiple Lightenna™ concealments can be mounted to the side of a building or to the sides of a pole to support multi-operator or multi-band deployments. Please contact ConcealFab customer service for additional information.

Neshaminy Church

Neshaminy, PA

We analyzed an existing equipment platform to accommodate an LTE expansion and designed a new layout for the LTE expansion cabinet and antenna shrouds in the steeple.

West Newbury Congregational Church

West Newbury, MA

The current facility was rebuilt after a 1984 fire. We designed a fiberglass replica of the church spire, re-installed antennas and added additional equipment in this confined space.

Brown University

Providence, RI

Our design for a facility within this historic building accommodated an internal back-up generator in one tower and HVAC equipment in another, as well as fire protection systems throughout the entire development area.

First Parish Church

Bedford, MA

Challenged with adding a fourth carrier within a structurally and logistically limited space, we designed additional reinforcements over the sanctuary to accommodate needed equipment near the rear of the church.

Alston/Brighton Congregational Church

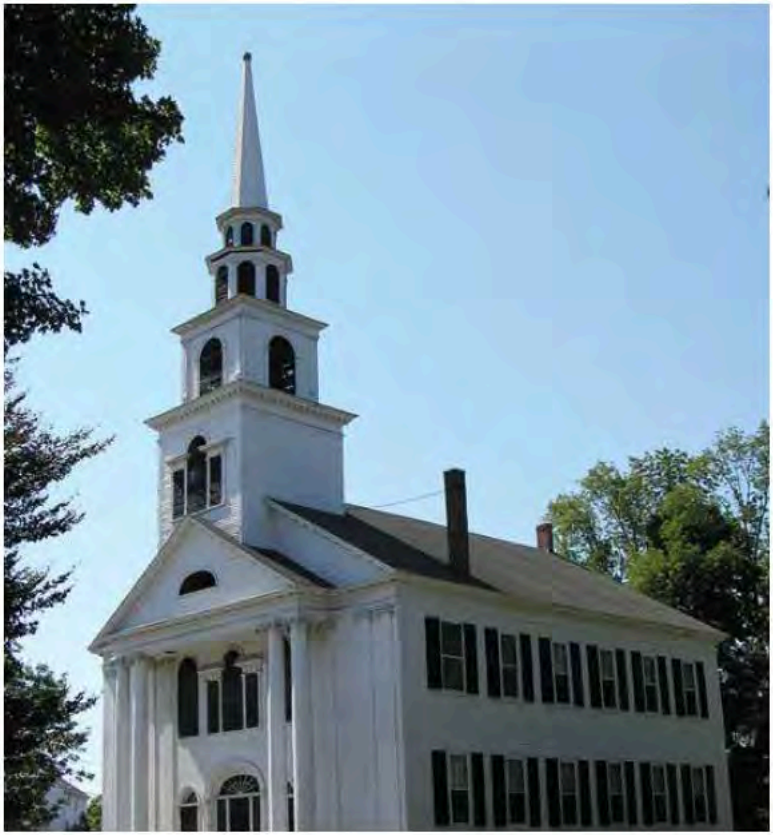
Brighton, MA

For ease and speed of construction, we designed this church installation to include equipment cabinets located in a third level space under the clock section with antennas in the oval windows below the steeple.

First Parish Church

Duxbury, MA

Due to limited space, we designed a custom garage accommodating telecommunication equipment in the basement with two generators and church storage on the ground level. Underground coaxial cable is routed to the church where a fiberglass replacement steeple houses the antennas.



First Baptist Church

Framingham, MA

Installing BTS equipment above the main entrance in the base of the steeple recently helped improve the façade of this church. We used the space behind new fiberglass louvers near the top of the steeple to install the telecommunications facility.

Fort Worth Tower

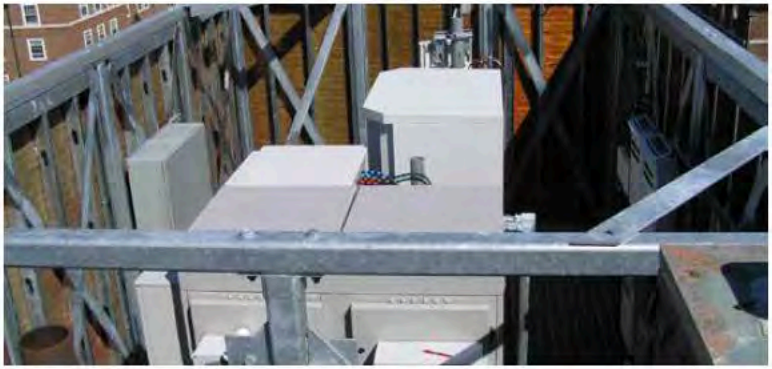
Wilmington, DE

For this steeple replacement, we designed the "paint to match" coaxial cable run to match various building finishes. The antennas are placed within the steeple with BTS equipment located out of sight in the basement.

Mattapan Church Antennas

Boston, MA

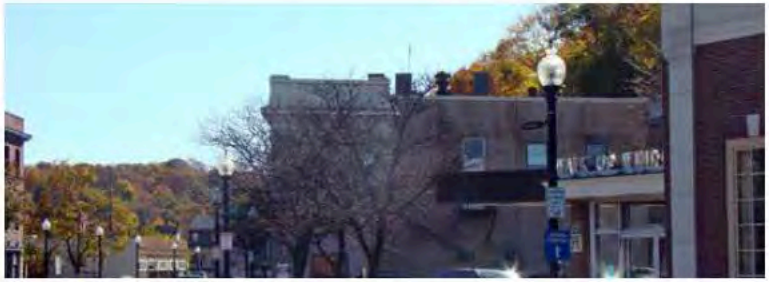
Antennas were placed in the bell level of this contemporary church. We designed the antennas to mount in the empty space between the columns and blend with the surroundings. A BTS equipment shelter was constructed in the basement of the church.



Harvard University Gilbert Hall

Cambridge, MA

Increased smart phone usage by students and limited coverage led to the design of this fiberglass penthouse housing a steel equipment platform, radio equipment, and a hidden sector of antennas. We designed a second sector in a custom low-profile fiberglass chimney.



The Riverside Theater

Boston, MA

In adding another carrier to this theater, we designed a false chimney and flue pipe. BTS equipment is located in the basement.

Nativity Catholic School

Washington, D.C.

Designed to blend with the architectural fabric of the surrounding community, we used a smaller cupola on a nearby building as a reference for the site design.

Curry College

Milton, MA

We designed six chimney-mounted antennas on a historic building. To reduce the aesthetic impact on the building, our designs included custom made antenna mounts and an equipment shelter at grade.

Blue Hill Avenue

Dorchester, MA

For this rooftop site, we mounted four false chimneys directly to the roof structure. The shelter was placed at grade within a compound near the back of the property, while cables were placed in a matching tray in the building's corner.

175 Beacon Street

Somerville, MA

We were challenged with installing additional equipment on the roof of this residential building, ultimately including a false chimney to blend with the historic neighborhood.

Charles Mark Hotel

Boston, MA

Nestled on the roof of a structure in Copely Square, a popular tourist destination, the facility is almost invisible to the average pedestrian without using any fiberglass concealment. We also located the shelter, generator, and antennas on the roof.