



Small Cell Infrastructure

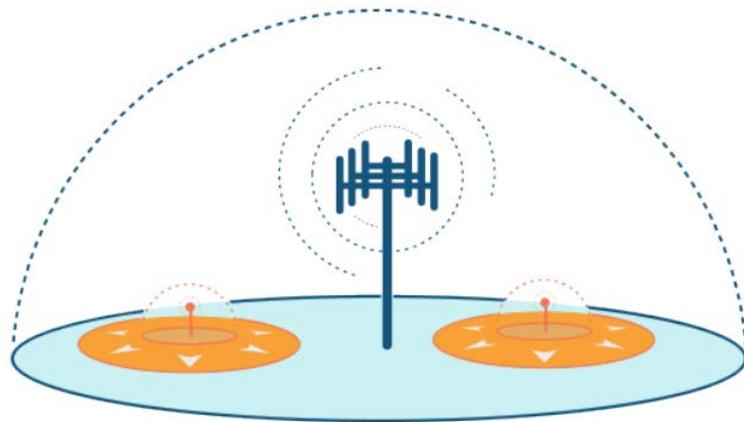
Public Information Meeting

Outline

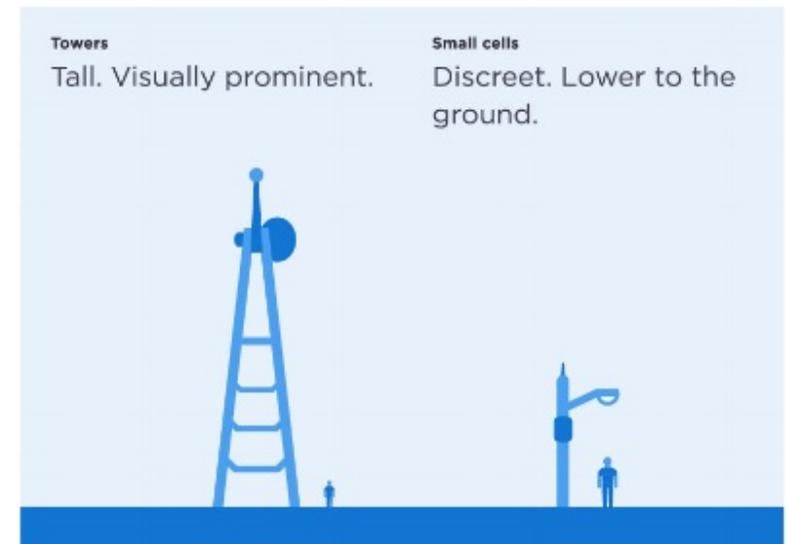
1. What and where are small cell facilities?
 - What is the role of City of Madison Public Works?
2. Why are we seeing a surge in requests to build small cells?
 - What type of infrastructure could be proposed?
3. Types of applicants
4. Laws and regulations on small cell
 - What does this mean?
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5. The permit
6. Our pole infrastructure
 - Who owns the current poles?
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 - Who to contact

What are small cell facilities?

- Small cell facilities are low-powered antennas that supplement the larger cellular network.



*Data transferred from small cells to large antenna
Source: Qualcomm Technology*



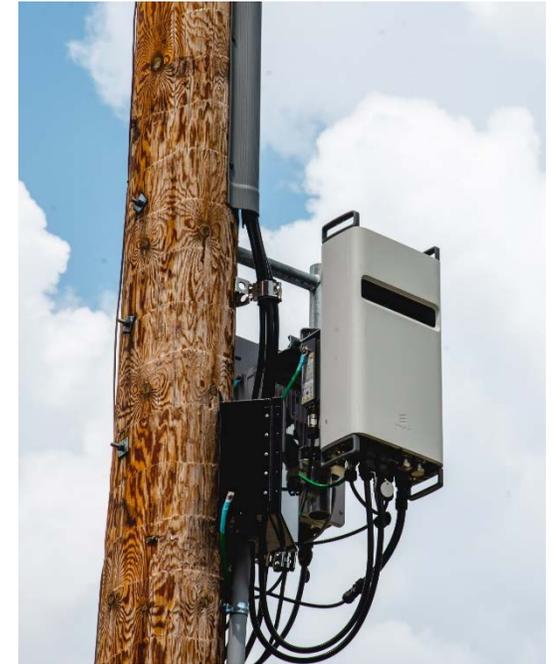
*Large cells vs. Small cells
Source: Crown Castle*

Where are small cell facilities?

- Small cell equipment is proposed to be located on poles, wires, or buildings.
- Small cell equipment is allowed in the public right-of-way.
- Small cell equipment will initially meet current network demands.
 - May be modified with future 5G high speed technology.



Small cell antenna



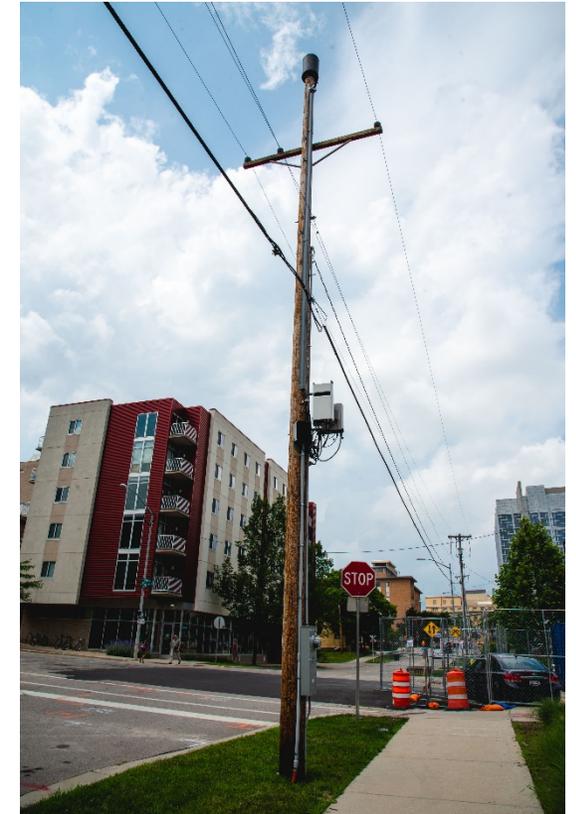
Small cell equipment attached to MG&E utility pole

What is the role of City of Madison Public Works?

City of Madison Public Works reviews applications in the public right-of-way.

- Make sure proposed locations are consistent with MGO for locations, type, and aesthetics.
- Review calculations to make sure installations are safe.
- Review to avoid conflicts with other public infrastructure.

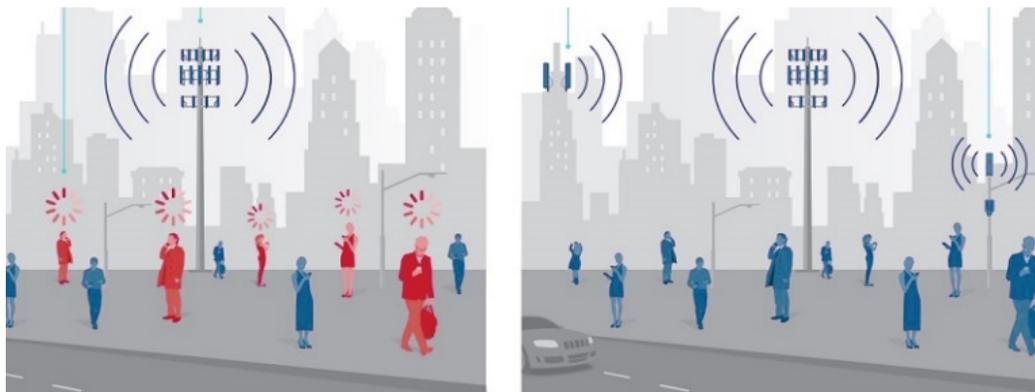
Public Works also inspects installations for consistency with approved plans and permits.



Small cell installation on an MG&E pole on Charter St. & Dayton St.

Why are we seeing a surge in requests to build small cells?

- Mobile data traffic has grown significantly.
- Concern that existing infrastructure is becoming congested.
- Most service is provided by large antennas mounted on towers.
- Small cell supplement larger antennas by increasing data speeds.



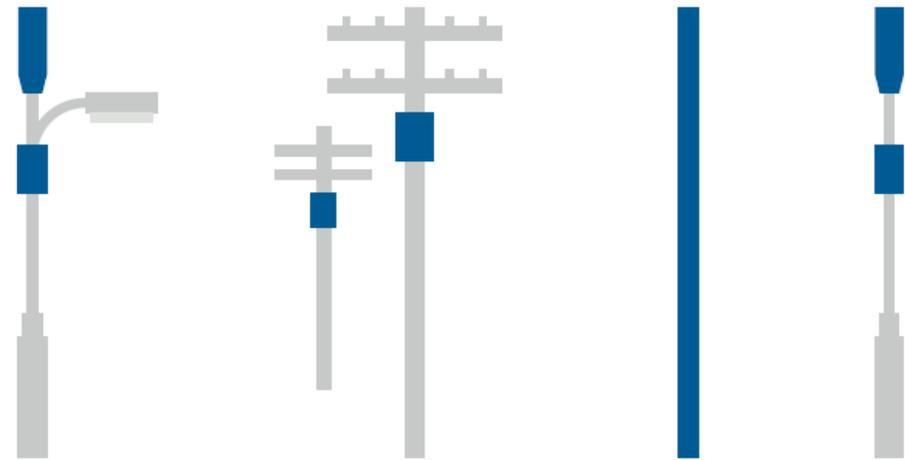
Congestion vs. Capacity
Source: Crown Castle



Typical large cellular antenna
Photo credit: Joe Ravi via Wikimedia Commons

What type of infrastructure could be proposed?

- Small cell facilities provide high data volume in a small area (1-2 blocks).
- Equipment, locations, and methods will vary throughout the City based on network needs.
- Typical locations:
 - Mounted on existing utility poles.
 - Mounted on new freestanding poles.
 - Attached to existing overhead lines strung between poles.
 - Mounted onto existing buildings.
- Increased small cell installations as 5G is implemented.



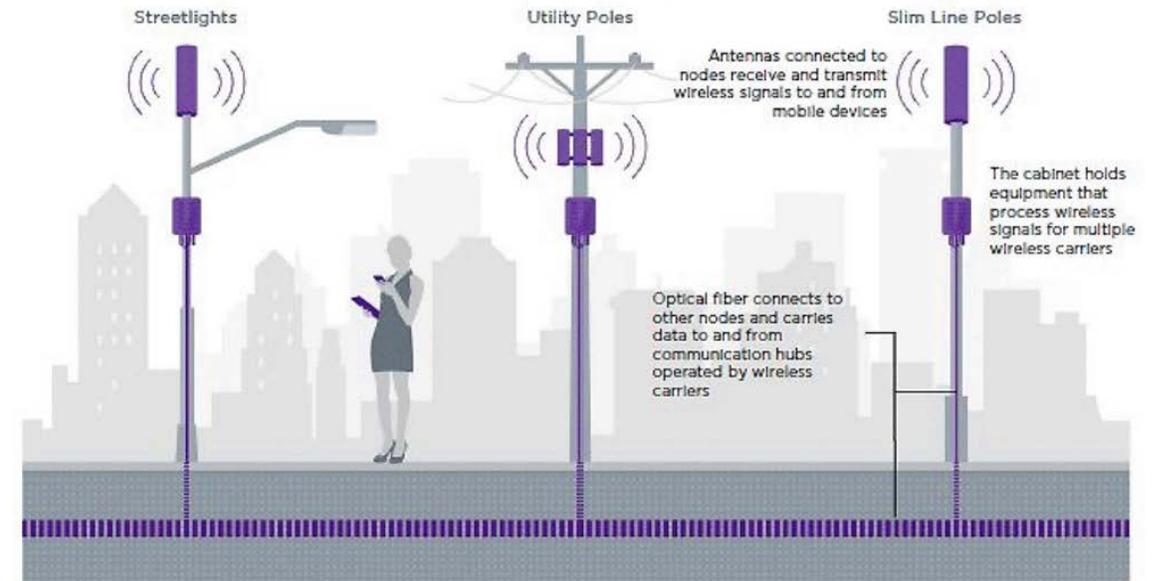
Possible small cell locations, on existing utilities (left), or new freestanding poles (right).

Types of applicants

- Companies that intend to install small cells follow a couple different business models.
- Some providers construct their own infrastructure to serve the wireless demand of their customers.
- Other companies may install infrastructure to lease or sell it to others.

What Are Small Cell Deployments?

Small cell deployments are complementary to towers, adding much needed coverage and capacity to urban and residential areas, venues, and anywhere large crowds gather



Source: Crown Castle

Laws and regulations on small cell



Federal law on small cell

- 2018: FCC released FCC-18-133.
- No federal law requires the City to open up its own infrastructure to telecom providers.

The screenshot shows the FCC website's document page for FCC-18-133. The header includes the FCC logo and navigation options like 'Browse by CATEGORY' and 'Browse by BUREAUS & OFFICES'. The main heading is 'FCC Facilitates Wireless Infrastructure Deployment for 5G'. Below this, there is a 'Document Dates' box with the following information: Released On: Sep 27, 2018; Adopted On: Sep 26, 2018; Issued On: Sep 27, 2018. A 'Tags' box lists: Antenna - Antennas and Towers - Base station - Cell site - Collocation - Communications Infrastructure - Distributed Antenna System (DAS) - Facility Siting - Infrastructure - Small Cell - Wireless Services. The 'Description' states: 'FCC removes barriers to wireless infrastructure deployment by clarifying scope of Sections 253 and 332 and establishing shot clocks for small wireless facilities'. The 'DA/FCC #' is FCC-18-133, 'Docket/RM:' is 17-79, 17-84, and 'FCC Record Citation:' is 33 FCC Red 9088 (14). The 'FCC Record:' is FCC-18-133A1_Rcd.pdf.

The screenshot shows the FCC document 'FCC-18-133' with the FCC logo and name at the top. The document title is 'FCC-18-133' and the section is 'INTRODUCTION'. The text reads: '1. America is in the midst of a transition to the next generation of wireless services, known as 5G. These new services can unleash a new wave of entrepreneurship, innovation, and economic opportunity for communities across the country. The FCC is committed to doing our part to help ensure the United States wins the global race to 5G to the benefit of all Americans. Today's action is the next step in the FCC's ongoing efforts to remove regulatory barriers that would unlawfully inhibit the deployment of infrastructure necessary to support these new services. We proceed by drawing on the balanced and commonsense ideas generated by many of our state and local partners in their own small cell bills. 2. Supporting the deployment of 5G and other next-generation wireless services through smart infrastructure policy is critical. Indeed, upgrading to these new services will, in many ways, represent a more fundamental change than the transition to prior generations of wireless service. 5G can enable increased competition for a range of services—including broadband—support new healthcare and Internet of Things applications, speed the transition to life-saving connected car technologies, and create jobs. It is estimated that wireless providers will invest \$275 billion¹ over the next decade in next-generation wireless infrastructure deployments, which should generate an expected three million new jobs and boost our nation's GDP by half a trillion dollars.² Moving quickly to enable this transition is important, as a new report forecasts that speeding 5G infrastructure deployment by even one year would unleash an additional \$100 billion to the U.S. economy.³ Removing barriers can also ensure that every community gets a fair shot at these deployments and the opportunities they enable. 3. The challenge for policymakers is that the deployment of these new networks will look different than the 3G and 4G deployments of the past. Over the last few years, providers have been increasingly looking to densify their networks with new small cell deployments that have antennas often no larger than a small backpack. From a regulatory perspective, these raise different issues than the construction of large, 200-foot towers that marked the 3G and 4G deployments of the past. Indeed, estimates predict that upwards of 80 percent of all new deployments will be small cells going forward.⁴ To support advanced 4G or 5G offerings, providers must build out small cells at a faster pace and at a far greater density of deployment than before. 4. To date, regulatory obstacles have threatened the widespread deployment of these new services and, in turn, U.S. leadership in 5G. The FCC has lifted some of those barriers, including our decision in March 2018, which excluded small cells from some of the federal review procedures designed for those larger, 200-foot towers. But as the record here shows, the FCC must continue to act in partnership with our state and local leaders that are adopting forward leaning policies. 5. Many states and localities have acted to update and modernize their approaches to small cell deployments. They are working to promote deployment and balance the needs of their communities. At the same time, the record shows that problems remain. In fact, many state and local officials have urged the FCC to continue our efforts in this proceeding and adopt additional reforms. Indeed, we have

¹ See Accenture Strategy, Accelerating Future Economic Value from the Wireless Industry at 2 (2018) (Accelerating Future Economic Value Report), <https://www.ctia.org/news/accelerating-future-economic-value-from-the-wireless-industry>, attached to Letter from Scott K. Bergmann, Senior Vice Pres., Reg. Affairs, CTIA to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-79 (filed July 19, 2018).
² See Accenture Strategy, Smart Cities: How 5G Can Help Municipalities Become Vibrant Smart Cities, (2017) <http://www.ctia.org/docs/default-source/default-document-library/how-5g-can-help-municipalities-become-vibrant-smart-cities-accenture.pdf>, attached to Letter from Scott Bergmann, Vice Pres., Reg. Affairs, CTIA to Marlene H. Dortch, Secretary, FCC, WT Docket No. 16-421, (filed Jan. 13, 2017).
³ Accelerating Future Economic Value Report at 2.
⁴ Letter from John T. Scott, Counsel for Mobilitec, LLC, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-79 at 2-3 (filed Sept. 12, 2018).

2

State law on small cell

- State law: Municipalities retain authority to regulate wireless infrastructure in the right-of-way.
- 2019 Wisconsin Act 14: **Enacted into law on July 10, 2019.**
- No state law requires the City to open up its own infrastructure to telecom providers.



The screenshot shows the Wisconsin State Legislature website. At the top, there is a search bar with the text "Search session: 'AB2' or 'mining'" and a "Search" button. Below the search bar is a navigation menu with links for "HOME", "SENATE", "ASSEMBLY", "COMMITTEES", "SERVICE AGENCIES", "DOCS", "OPTIONS", and "HELP". The main content area is titled "2019-2020 Wisconsin Legislature" and features "Senate Bill 239". The description of the bill is: "An Act to create 66.0404 (4e) and 66.0414 of the statutes; Relating to: limiting the authority of the state and political subdivisions to regulate certain wireless facilities and authorizing political subdivisions to impose setback requirements for certain mobile service support structures. (FE)". The status is listed as "S - Enrolled". Below this, there is a section for "Important Actions (newest first)" which contains a table with the following data:

Date / House	Action	Journal
6/25/2019 Sen.	LRB correction	281
6/5/2019 Sen.	Read a third time and passed, Ayes 27, Noes 5	237

City ordinance on small cell

- In Spring 2019, City Council adopted ORD-19-00037, which will create Section 10.053 Madison General Ordinances.
- The ordinance will take effect August 1, 2019.

The screenshot shows the City of Madison website interface. The header includes the city name, a search bar, and navigation links for notifications, sign in, and help. The main content area displays the ordinance text for Section 10.053. The text includes definitions for terms like Administrator, Application, Applicant, Base Station, Eligible Facilities Request, FCC, Registrant, Right-of-way, and Small Wireless Facility. The ordinance is dated June 29, 2019, and is currently in effect.

CITY OF MADISON

LEGISTAR #55033 - Body

DRAFTER'S ANALYSIS: This ordinance would create, to the extent allowed by Federal and State laws and regulations, a wireless telecommunications facility permit.

There has been an increased demand to place small cell wireless facilities in the right-of-way on existing or new infrastructure, which demand is being driven to address the cellular data needs of the public and the forthcoming deployment of "5g" cellular networks. This new technology is based upon the deployment of a vast network of "small" wireless facilities throughout the coverage area. Several different providers have already contacted the City about the placement of these facilities in the right-of-way, collocated on existing poles, on new poles and even on City-owned infrastructure outside of the right-of-way. The City currently does not separately regulate small cell facilities, but telecommunication carriers are required to comply with Section 10.05, MGO, when placing facilities in the right-of-way.

In 2018, the Federal Communication Commission released FCC-18-133, an order interpreting federal law that limits state and local regulation of small cell placement in the right-of-way based upon federal preemption grounds. Under federal law and the order, municipal regulations are preempted if they prohibit or have the effect of prohibiting the provision of telecommunications service or personal wireless service. The order states that it is an "effective prohibition" on such service if a local regulation "materially limits or inhibits any competitor's or potential competitor's ability to compete in a fair and balanced legal and regulatory environment." This "effective prohibition" test applies to the City's regulations applicable to these type of installations, including application deadlines, fees, and other placement or aesthetic requirements. While this order is being appealed, it went into effect on January 15, 2019, and the City must comply with it.

The intent of this ordinance would be to exercise the City's authority to regulate the placement and maintenance of wireless facilities in the right-of-way to the fullest extent provided for by federal and state law. The demand for such right-of-way use is expected to increase significantly in the near future and this ordinance will provide a better framework, consistent with the requirements of federal law, for the City to exercise regulatory authority over the placement and maintenance of these facilities. Of note, under the ordinance the City Engineer will be tasked with administering this permit, which is consistent with the City Engineer's existing authority over use of the right-of-ways by registered utilities under Sec. 10.05. The ordinance will be enforceable by City Engineering, Building Inspection, the Street Superintendent, and Traffic Engineering, which is consistent with other similar right-of-way ordinances. Permit fees will need to be determined and established by the Board of Public Works, keeping in mind the presumptive reasonable fee levels established by the FCC. In addition, the City will need to establish aesthetic standards that are consistent with the order (which standards must apply to all utility facilities in the right-of-way). Finally, this ordinance notes that the City may enter into agreements to allow collocation of small cell facilities on City-owned or City-controlled infrastructure (street lights, traffic signals, etc.). However, such collocation is not required, nor is it provided for by this ordinance. Any such use of City owned infrastructure would have to be separately approved by the Council either by agreements or by a general ordinance applicable to all providers. Of note, the FCC orders significantly limit the fees that the City may charge for locations on City-owned or City-controlled infrastructure.

In order to give the City sufficient time to develop the permit fees, the aesthetic standards, and the wireless regulations called for by the Ordinance, the effective date of this ordinance is being delayed to August 1, 2019.

.....

The Common Council of the City of Madison do hereby ordain as follows:

1. Create Section 10.053 of the Madison General Ordinances entitled "Wireless Telecommunications Facilities in the Right-of-Way" as follows:

***10.053 WIRELESS TELECOMMUNICATIONS FACILITIES IN THE RIGHT-OF-WAY.**

(1) Definitions. For the purposes of this Section, the following definitions apply:

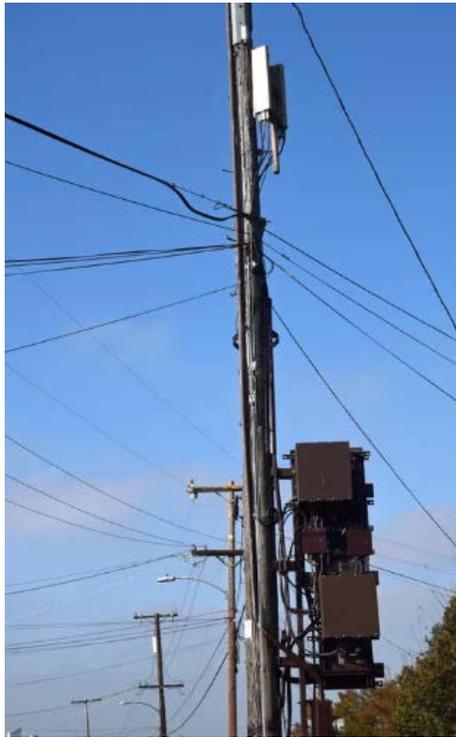
What does this mean?

Local regulation on wireless infrastructure is subject to the parameters of federal and state law.

- The FCC order is currently under appeal, but for now the City must comply with the order.
- Under federal regulation:
 - Small cell carriers can be in the City's right-of-way.
 - The City cannot ban small cells.
 - The City cannot limit new pole placement.
 - The City is capped on how much it can charge for permit fees.
 - The City cannot limit infrastructure from being strand mounted on a utility pole.
 - The antenna cannot be larger than 3 cubic feet in volume, and all equipment may be no larger than 28 cubic feet.
- The City cannot prevent installation in the right-of-way, but the City can dictate appearance and, in some cases, the location of facilities.
- The City can exercise authority over facilities that are co-located with City infrastructure.

What can the City do?

- The City is implementing interim design guidelines as a framework to maintain the aesthetics of our City.



*Without City input (Oakland, CA)
Photo credit: Kent German/CNET*



*With City Input (Denver, CO)
Photo credit: City of Denver Public Works*



*With City Input (San Francisco, CA)
Photo credit: Verizon*

The permit



The process

Small Cell Permit – MGO Section 10.053

- Service providers will be required to take out a small cell permit.
 - Location
 - Pole type
 - Plans for the work and structural calculations
 - Copy of notice to residents
- The permit will be reviewed by City Engineering to ensure it follows the City’s design guidelines and aesthetic standards.



Excavation permit – MGO Section 10.05(6)

- In addition to a small cell permit, if applicants are installing a new pole or replacing an existing pole.

Street occupancy permit – MGO Section 10.055

- In addition to a small cell permit, if applicants are mounting equipment to an existing pole.

Our pole infrastructure



Who owns the current poles?

- The City owns and maintains about 7450 street light poles.
- MG&E maintains about 6150 street light poles.
- Alliant Energy owns and maintains about 1100 street light poles.



From left to right: Concrete pole on path, same as on residential streets (25 ft); 30 ft with twin side of pole fixtures on John Nolen; Residential Concrete Post Top (20 foot); 30 ft with 10 ft arm; 30 ft pole with side pole fixture, brackets for banners/snowflakes and flower pots

NOTE: All poles pictured are City-owned.

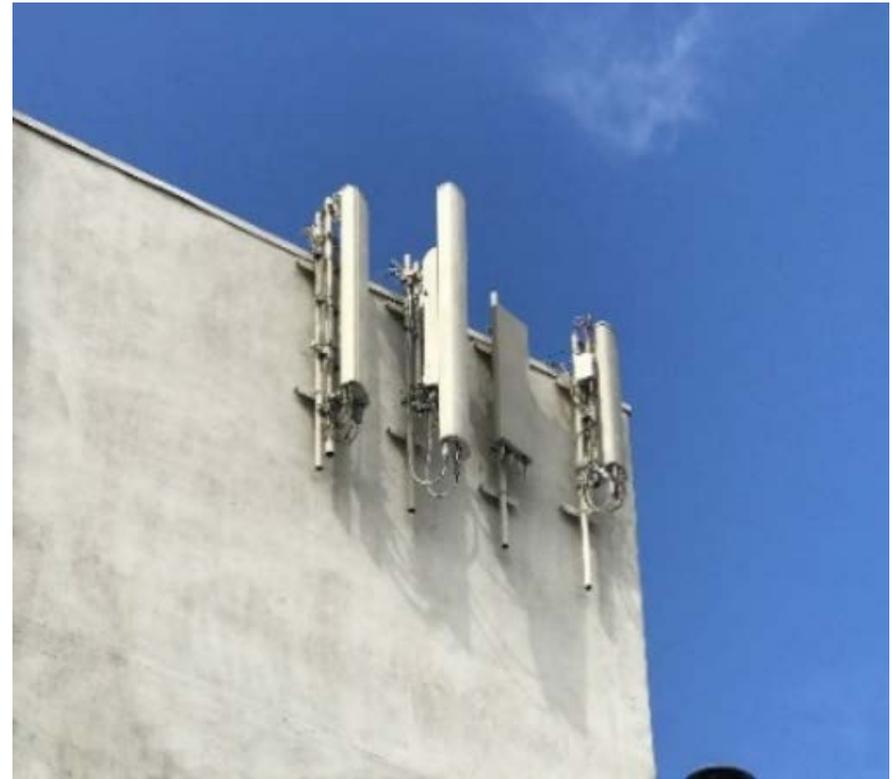
Why can't small cell facilities be placed on current City of Madison poles?

Existing poles and bases will likely need to be replaced for the following reasons:

- Separate power will be needed.
- Separate fiber lines might be required.
- Transformer bases (located between the concrete foundation base and street pole base) will be required.
- New concrete foundation bases will be required.
- The existing poles do not have the structural integrity required to support street lighting plus the addition of small cell equipment.

Why can't small cell facilities be located on private property?

- Cellular infrastructure can be located on private property.
 - However, this necessitates an agreement between the service provider and the property owner.
 - May be subject to zoning and land use restrictions.
- Any license, lease, or easement may take time to negotiate.
 - Providers have no ability to require cellular placement in desirable locations.



Source: City of Denver Public Works

Why can't small cell facilities be combined onto one pole?

- Each wireless provider has different objectives and may not need the same locations.
- Each carrier states that some separation with competing antennas is necessary to avoid signal interference.
- The ability for multiple carriers to share antennas or poles is closer to reality.
- The City is exploring all options to minimize new infrastructure in the right-of-way.

Interim small cell design guidelines



Can the City standardize small cell infrastructure?

- Any regulated telecommunications utility may lawfully place its facilities in the public right-of-way.
- Federal regulations dictate broad parameters on the size of such facilities.
 - Antenna: up to 3 cubic feet in volume.
 - Equipment: up to 28 cubic feet in volume.
 - Equipment attached to strands: up to 1 cubic foot.
- The City cannot prevent installation in the right-of-way, but can dictate other aspects.
- The City exercises authority over facilities co-located with City infrastructure.



Freestanding Small Cell in Amenity Zone

General location guidelines

Small cell infrastructure shall not be located along front or side boundary lines of City landmarks.

- Preferred locations:
 - Industrial and commercial areas.
- Non-preferred locations:
 - Residential neighborhoods, designated open space, conservation areas, or Special Interest Area Districts.
- Service providers must avoid prominent vistas or significant public view corridors.



Small Cell in Commercial Area

Location specifications

New facilities and infrastructure must:

- Not create a vision hazard at intersections and driveways.
- Not obstruct, impede, or hinder vehicular, bicycle, or pedestrian traffic. Includes ADA compliance.
- To the extent possible, avoid interference with right-of-way maintenance activities.

New facilities and infrastructure must:

- Align and space evenly with existing trees and infrastructure.
- Be located near or at the extension of property lines whenever possible.
- Not be located directly in front of entrances or windows.



Freestanding Small Cell Location Between Property and Trees

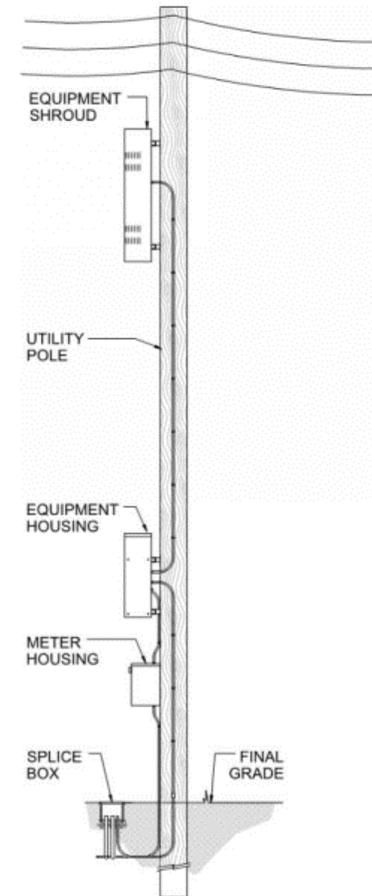
Height restrictions and requirements

Support structures, towers, and utility poles:

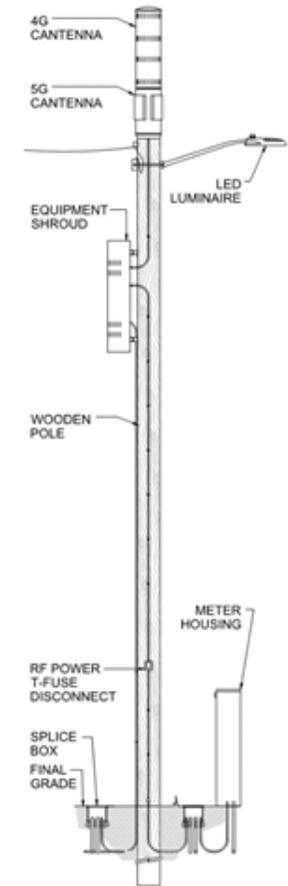
- Height can be no more than 10% higher than any pole on the same block (up to a maximum of 50 feet).

Equipment:

- Must be minimum of 12 feet above pedestrian thoroughfare.
- Minimum of 16 feet above any traffic lane.



Attachment to Utility Pole



Attachment to Wooden Streetlight Pole
CITY OF MADISON

General aesthetic standards

- Must be compatible in style and color to similar facilities in the immediate area.
- The diameter of new support structures is to be minimized.
- Antennas located at the top are incorporated into the structure with shrouds.
- All equipment is to be shrouded with wiring and cabling concealed within or flush to the support structure.
- No facility is permitted in historic or urban design districts if contrary to or destructive of the character of the district.
- Facilities must minimize noise as provided in MGO.
- Facilities cannot be illuminated, except in accordance with federal or state regulations or if incorporated with a street light pole.
- Signage is not permitted except to comply with FCC or Wisconsin regulations to provide safety warning or emergency contact information.
- Facilities are to be placed appropriately to maintain streetscape aesthetics.

Interim freestanding pole standards

Equipment for Freestanding Poles:

- Antenna must include a smooth transition between riser pole and antenna attachment.
- Conduit, mounting bracket, and other hardware must be hidden from view.
- Upper pole shall be smooth and straight, with 1.5 inch (max) of flat surface where mounted to equipment cabinet.
- 16-inch round cabinet is allowed (unless applicant can show 20-inch cabinet is required).
- Poles must be architecturally compatible to surrounding poles.



Unacceptable installation



Acceptable installation

Special interest area districts

Definition:

- Historic districts
- Historic landmark properties
- Areas included within Urban Design Districts, UMX, DC, and Downtown Capital Corridor
- Undergrounding Districts
- Other areas of interest as defined in maps located in the interim design standards

General guidelines:

- Infrastructure in unnamed alleys within historical districts must be setback 20 feet.
- Equipment, other than the meter, must be a minimum of 17 feet above ground.

Capitol Square, Outer Loop, State Street, or spoke streets between the Square and Outer Loop:

- All equipment, other than the antenna, must be completely concealed in a decorative street amenity (owned and maintained by the small cell company).
 - Or installed in an underground vault.

Resident Resources

City of
Madison

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Services

Jobs

Agencies ▾

Data ↗

Contact ▾

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Small Cell Infrastructure

The City of Madison is getting ready for 5G implementation. The City is developing guidelines that will allow cellular companies to locate Small Cell installations in a way that maximizes technological benefits, while attempting to preserve street-side aesthetics.



About Small Cell Facilities

The City of Madison has developed interim design standards for small cell facilities.



Permits

Small cell permits will be reviewed by City Engineering. Applicants may also be required to take out an excavation permit or a street occupancy permit.



Resident Resources PDF

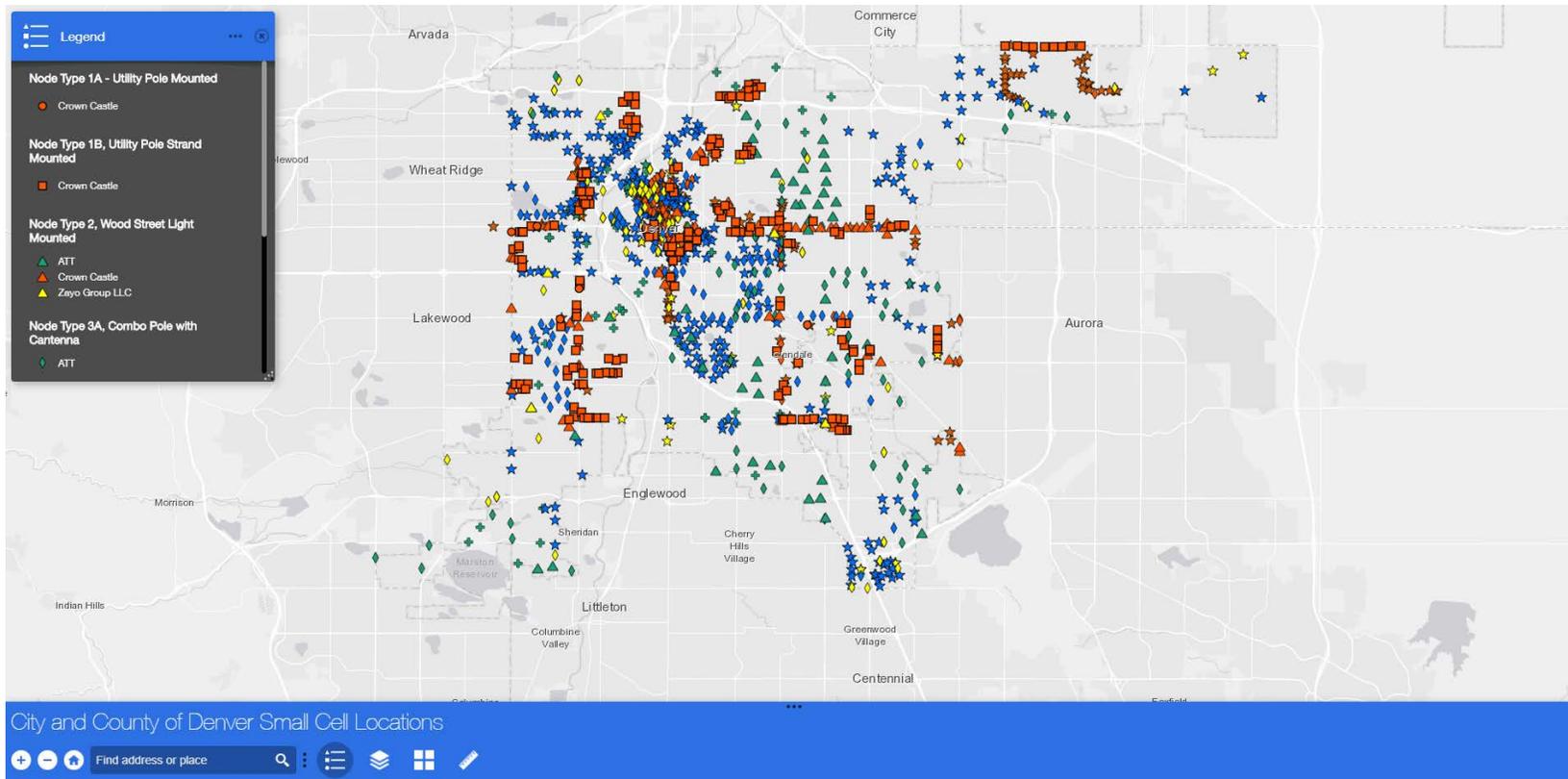
Find out how the City of Madison is getting ready for 5G implementation by downloading the City's small cell brochure.



Federal and State Law

Local regulation of wireless infrastructure is subject to the parameters of federal and state law.

Online Resources



Source: The City and County of Denver Public Works Department

<https://geospatialdenver.maps.arcgis.com/apps/webappviewer/index.html?id=0a1341b75cd54e7eb7179e661b1c9680>

Small Cell Infrastructure



The City of Madison is getting ready for 5G implementation. The City is developing guidelines that will allow cellular companies to locate Small Cell installations in a way that maximizes technological benefits, while attempting to preserve street-side aesthetics.

What are Small Cell facilities?

- Small Cell facilities are low-powered antennas that provide cellular and data coverage to smaller geographic areas, supplementing the larger cellular network.
- Small Cell equipment is proposed to be located on poles, wires, or buildings.
- Small Cell equipment is allowed in the public right-of-way per Federal and State Law just like other utilities.
- Small Cell equipment will initially meet current 4G (LTE) voice and data demands, but may be modified with future 5G higher speed equipment as technology changes.

What is the role of City of Madison Public Works related to Small Cell infrastructure?

City of Madison Public Works reviews applications for Small Cell equipment in the public right-of-way.

- Make sure proposed locations are consistent with MGO for locations, type, and aesthetics.
- Review calculations to make sure installations are safe.
- Review to avoid conflicts with other public infrastructure.

Public Works also inspects installations for consistency with approved plans and permits.



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Health concerns with small cell

According to the FCC's Radio Frequency Safety webpage: <https://www.fcc.gov/general/radio-frequency-safety-0>

- The FCC is required to evaluate the effect of emissions from FCC-regulated transmitters on human health.
- Current regulations governing RF safety were put in place in 1996.
- The FCC relies on health and safety organizations to determine appropriate levels of RF exposure.
- Long-term research on small cell RF exposure is currently underway by outside agencies.

Contact the FCC's RF Safety Program at rfsafety@fcc.gov or 1-888-225-5322.

Who to contact in state government

	Name	Contact Information
State Assembly	Representative Melissa Sargent, <i>District 48</i>	(608) 266-0960 Rep.Sargent@legis.wisconsin.gov
	Representative Chris Taylor, <i>District 76</i>	(608) 266-5342 Rep.Taylor@legis.wisconsin.gov
	Representative Shelia Stubbs, <i>District 77</i>	(608) 266-3784 Rep.Stubbs@legis.wisconsin.gov
	Representative Lisa Subeck, <i>District 78</i>	(608) 266-7521 Rep.Subeck@legis.wisconsin.gov
State Senate	Senator Mark Miller, <i>District 16</i>	(608) 266-9170 Sen.Miller@legis.wisconsin.gov
	Senator Fred A. Risser, <i>District 26</i>	(608) 266-1627 Sen.Risser@legis.wisconsin.gov

Who to contact in federal government

	Name	Contact Information
U.S. House	Representative Mark Pocan, <i>District 2</i>	Madison Office: (608) 258-9800 Washington, D.C. Office: (202) 225-2906
U.S. Senate	Senator Ron Johnson	Madison Office: (608) 240-9629 Washington, D.C. Office: (202) 224-5323
	Senator Tammy Baldwin	Madison Office: (608) 264-5338 Washington, D.C. Office: (202) 224-5653
Federal Communications Commission	Federal Communications Commission (FCC)	1-888-225-5322
	Ajit Pai, <i>Chairman</i>	Ajit.Pai@fcc.gov
	Michael O’Rielly, <i>Commissioner</i>	Mike.O’Rielly@fcc.gov
	Brendan Carr, <i>Commissioner</i>	Brendan.Carr@fcc.gov
	Jessica Rosenworcel, <i>Commissioner</i>	Jessica.Rosenworcel@fcc.gov
	Geoffrey Starks, <i>Commissioner</i>	Geoffrey.Starks@fcc.gov



Questions?