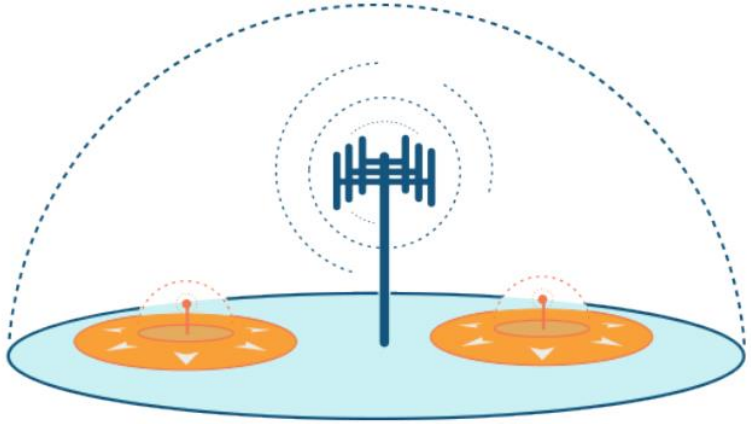
Small Cell Infrastructure

Presentation to Common Council Executive Committee, August 6, 2019

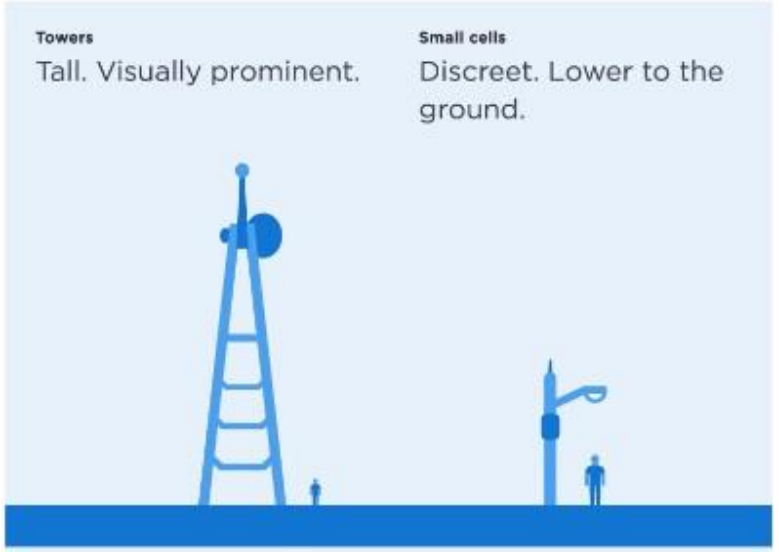
Presented by Sarah Edgerton, Doran Viste and Jim Wolfe

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



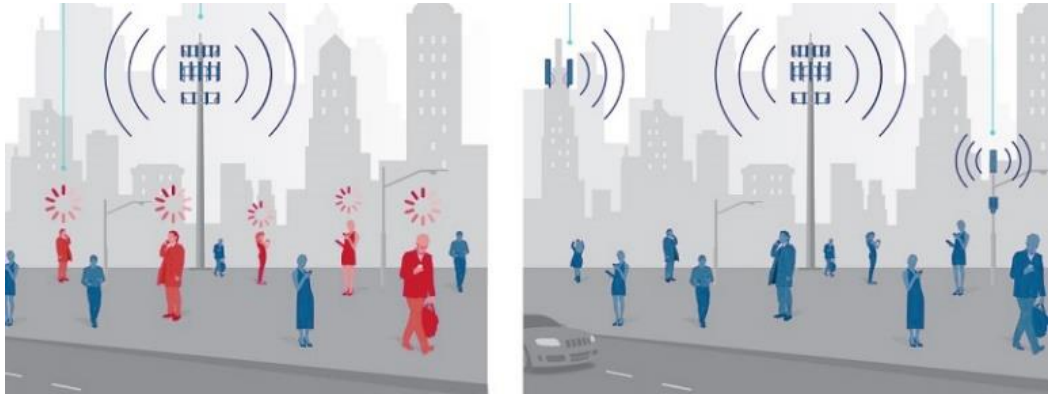
Large cells vs. Small cells
Source: Crown Castle

Why is there increase demand to build small cells?

Why?

- 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.

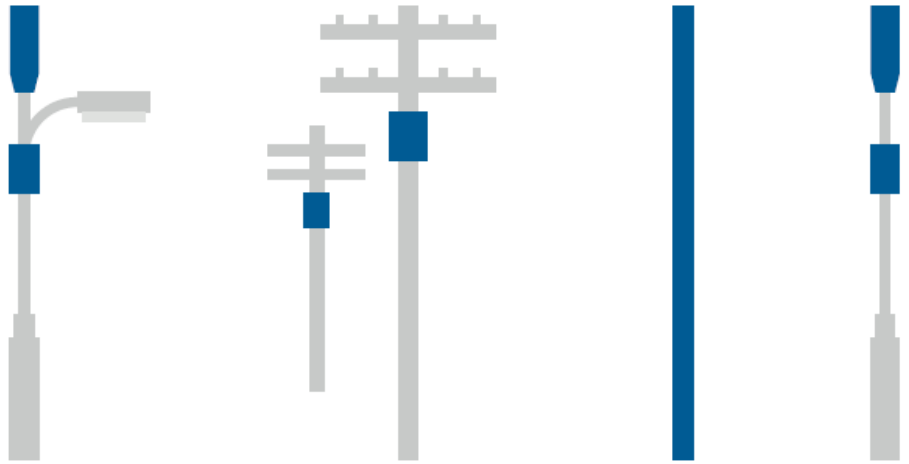
Small cell antenna



Congestion vs. Capacity
Source: Crown Castle

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).

How Many and When?

Industry Standard is 10 to 60 sites per square mile per carrier

- 4 carriers: AT&T, Verizon, Sprint, T-Mobile

Madison is 100.9 square miles
If we had 30 sites x 4 carriers x 101 square miles= ~12,120

Next 3 to 5 years

Laws and regulations on small cell

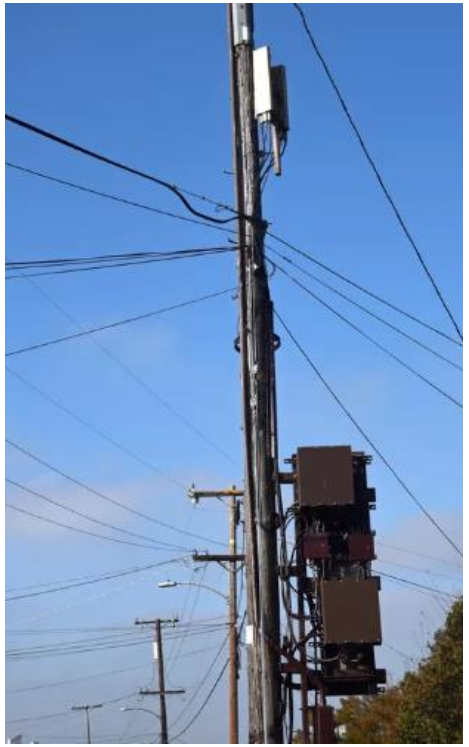
Key points

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

Interim Design Standards for Poles

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
- 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:

- Cantenna must include a smooth transition between riser pole and cantenna 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

CITY OF MADISON

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

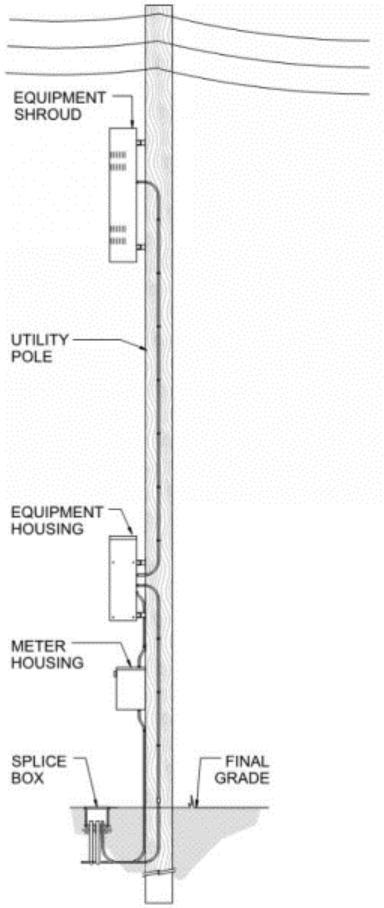
Height restrictions and requirements

Support structures, towers, and utility poles:

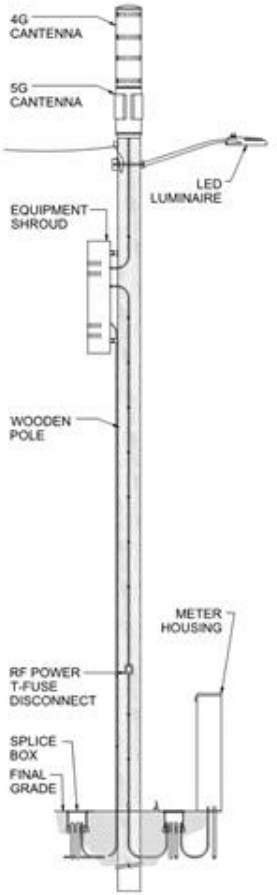
- Height can be no more than 10% higher than any pole on the same block (up to a maximum of 50 feet).

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

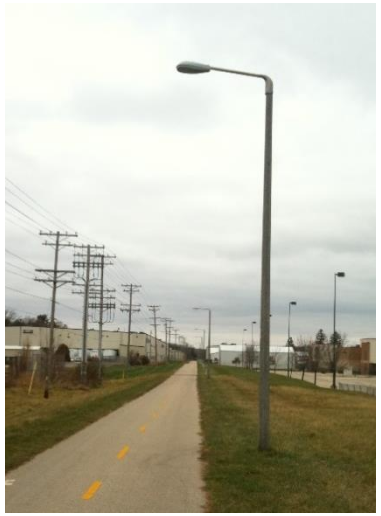
CITY OF MADISON

Small Cell Facilities on City Street Lights

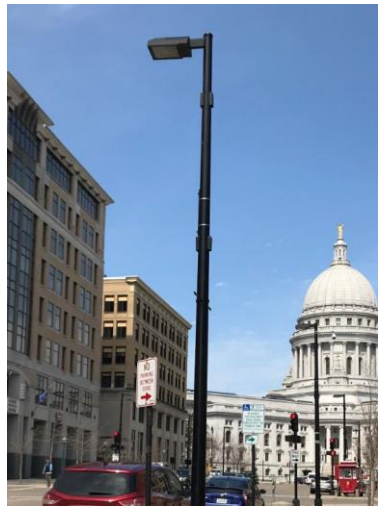
Small Cell Facilities on City Street Lights

Current Pole Infrastructure

- 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.

CITY OF MADISON

Small Cell Co-locating

- 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.

City of Los Angeles, Courtesy of City of Torrance, Ca

Outreach to Residents

About Small Cell Facilities

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

Resident Resources

Find out how the City of Madison is getting ready for 5G implementation by downloading the City's small cell brochure and the information presented at the public information meeting.

Federal and State Law

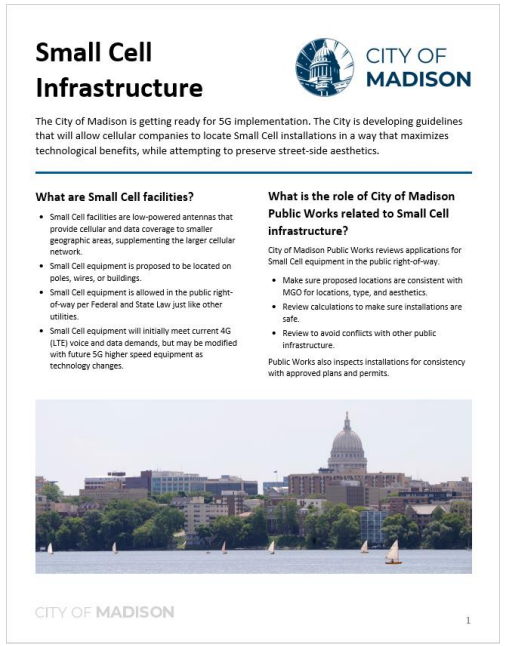
Local regulation of wireless infrastructure is subject to the parameters of federal and state law.

Permit

Contact

Contact us with your questions about small cell infrastructure.

www.cityofmadison.com/smallcell



Small Cell Infrastructure

CITY OF MADISON

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?

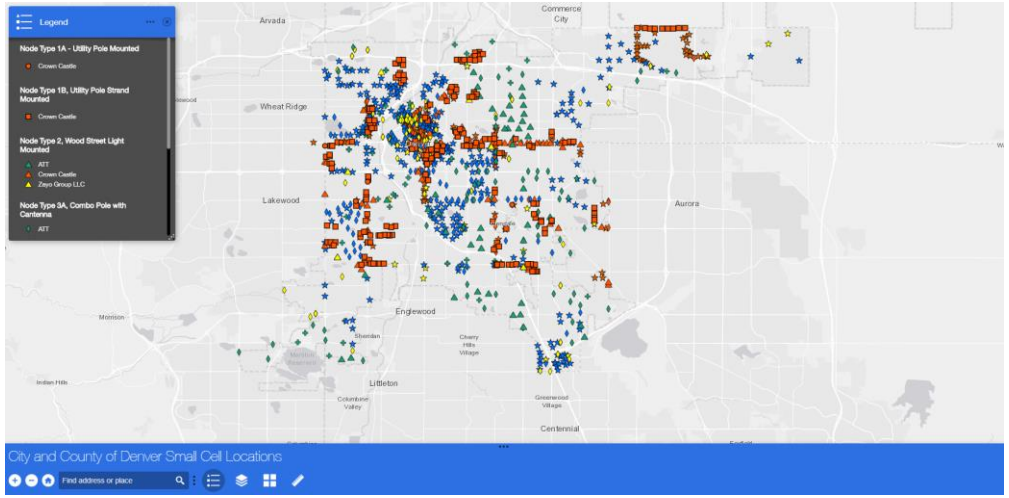
City of Madison Public Works reviews applications for Small Cell equipment in the public right-of-way.

- 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.

CITY OF MADISON

1



Source: The City and County of Denver Public Works Department
https://geospatialdenver.maps.arcgis.com/apps/webappviewer/index.html?id=0a1341b75cd54e7eb7179e661b1c9680

CITY OF MADISON

Who to Contact

State & Federal Government Contacts

Contact your representatives about current and upcoming legislature regarding Small Cell facilities.

	Name	Contact Information
State Assembly	Representative Melissa Sargent *Assembly District 48*	(608) 266-0960 | Rep.Sargent@legis.wisconsin.gov
	Representative Chris Taylor *Assembly District 76*	(608) 266-5342 | Rep.Taylor@legis.wisconsin.gov
	Representative Shelia Stubbs *Assembly District 77*	(608) 266-3784 | Rep.Stubbs@legis.wisconsin.gov
	Representative Lisa Subeck *Assembly District 78*	(608) 266-7521 | Rep.Subeck@legis.wisconsin.gov
State Senate	Senator Mark Miller *Senate District 16*	(608) 266-9170 | Sen.Miller@legis.wisconsin.gov
	Senator Fred A. Risser *Senate District 26*	(608) 266-1627 | Sen.Risser@legis.wisconsin.gov
U.S. House	Representative Mark Pocan *WI Congressional District 2*	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, *Chairman*	Ajit.Pai@fcc.gov
	Michael O'Rielly, *Commissioner*	Mike.O'Rielly@fcc.gov
	Brendan Carr, *Commissioner*	Brendan.Carr@fcc.gov
	Jessica Rosenworcel, *Commissioner*	Jessica.Rosenworcel@fcc.gov
	Geoffrey Starks, *Commissioner*	Geoffrey.Starks@fcc.gov

Residential Health Concerns

The Public Health Madison Dane County (PHMDC) Environmental Epidemiologist is working on a white paper summarizing the scientific research about the health impact of small cell should there be any available. They anticipate having this completed by mid-August.

- Share with the Mayor and the Common Council
- Share with residents
- Based of PHMDC's white paper, City will decide on next steps.

FCC Health Resources

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.

Questions?