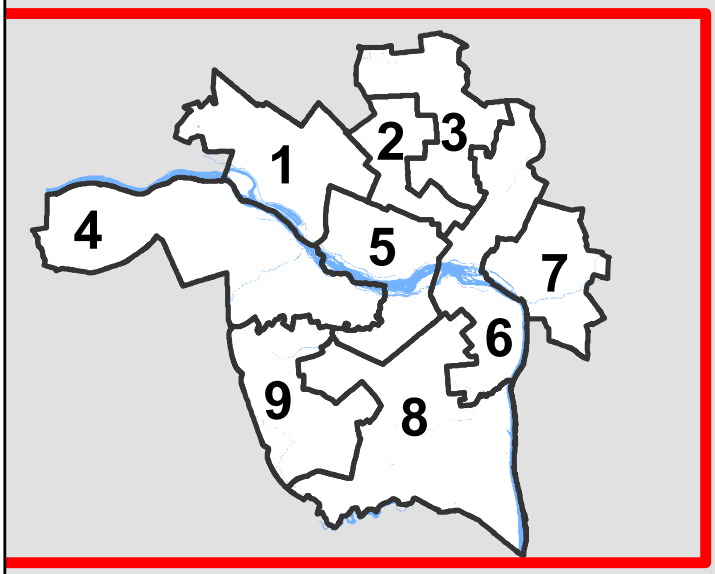
City of Richmond
Department of Planning & Development Review

17.05 Review

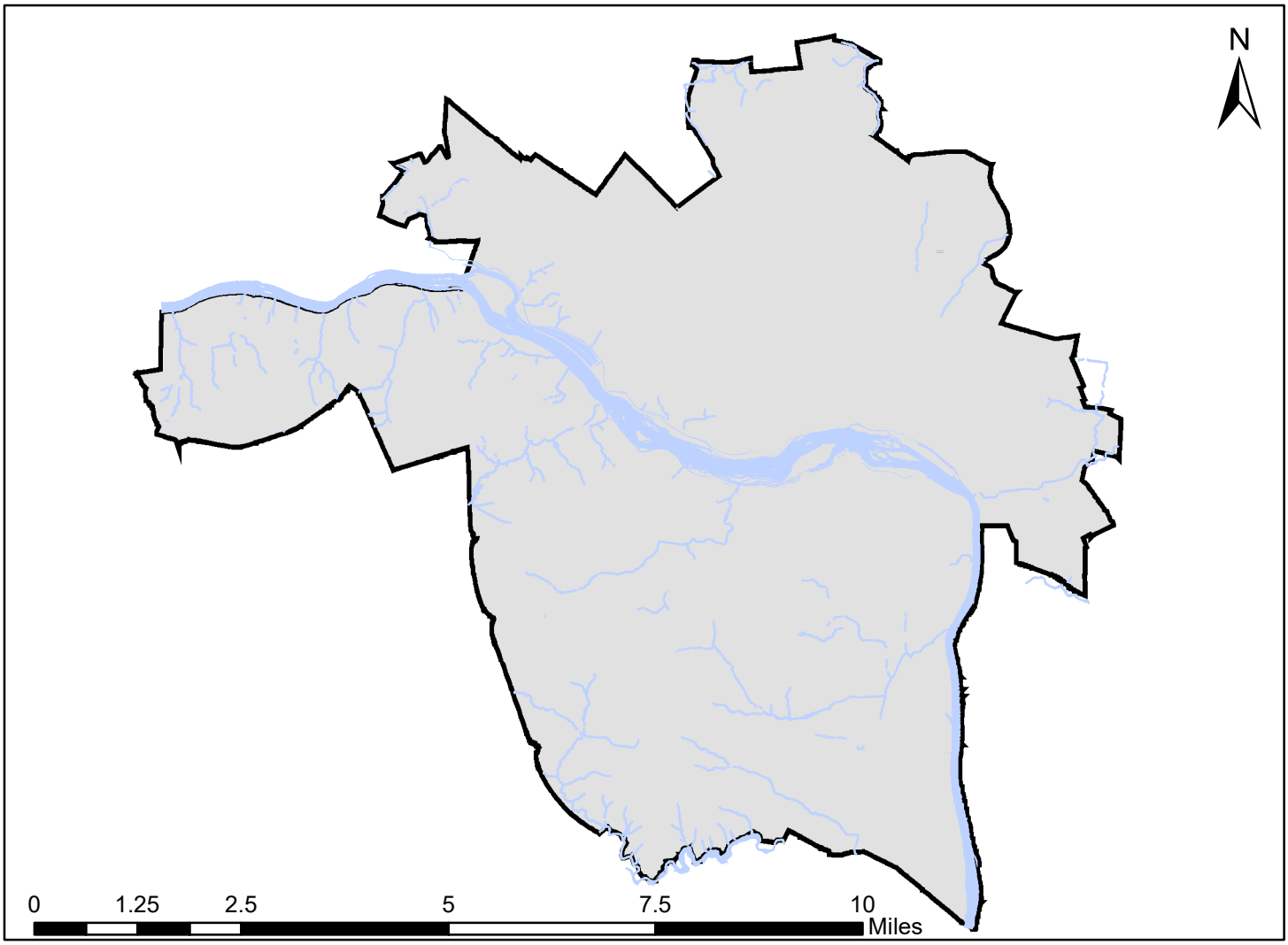
LOCATION: City-wide

COUNCIL DISTRICT: City-wide

PROPOSAL: Conceptual review of Small Cell Antenna Pole Attachments



For questions, please contact Josh Son at 646-3741 or joshua.son@richmondgov.com



Application for URBAN DESIGN COMMITTEE Review

Department of Planning and Development Review
Planning & Preservation Division
900 E. Broad Street, Room 510
Richmond, Virginia 23219
(804) 646-6335
http://www.richmondgov.com/CommitteeUrbanDesign

Application Type

- ☐ Addition/Alteration to Existing Structure
- ☑ New Construction
- ☐ Streetscape
- ☐ Site Amenity
- ☐ Encroachment
- ☐ Master Plan
- ☐ Sign
- ☐ Other

Review Type

- ☐ Conceptual
- ☐ Final

Project Name: Pole Attachment for Wireless Technology

Project Address: Richmond City Limits

Brief Project Description (this is not a replacement for the required detailed narrative) :

Any Vendor requesting to attached to Department Of Public Utilites Streetlight Poles are required follow the attached drawings for all small cell technology attachments.

Applicant Information

(on all applications other than encroachments, a City agency representative must be the applicant)

Name: Alfred Scott Email: alfred.scott@richmondgov.com

City Agency: Richmond Gas Works & Streetlights Phone: 646-8307

Address: 400 Jefferson Davis Hwy Richmond Va. 23224

Main Contact (if different from Applicant):

Company: Phone:

Email:

Submittal Deadlines

All applications and support materials must be filed no later than 21 days prior to the scheduled meeting of the Urban Design Committee (UDC). Please see the schedule on page 3 as actual deadlines are adjusted due to City holidays. **Late or incomplete submissions will be deferred to the next meeting.**

Filing

Applications can be mailed or delivered to the attention of "Urban Design Committee" at the address listed at the top of this page. **It is important that the applicant discuss the proposal with appropriate City agencies, Zoning Administration staff, and area civic associations and residents prior to filing the application with the UDC.**

UDC Background

The UDC is a ten member committee created by City Council in 1968 whose purpose is to advise the City Planning Commission on the design of projects on City property or right-of-way. The UDC provides advice of an aesthetic nature in connection with the performance of the duties of the Commission under Sections 17.05, 17.06 and 17.07 of the City Charter. The UDC also advises the Department of Public Works in regards to private encroachments in the public right-of-way.

Small Cell Equipment in Public Rights-of-Ways

City of Richmond- DPU - January 17, 2019

KCI

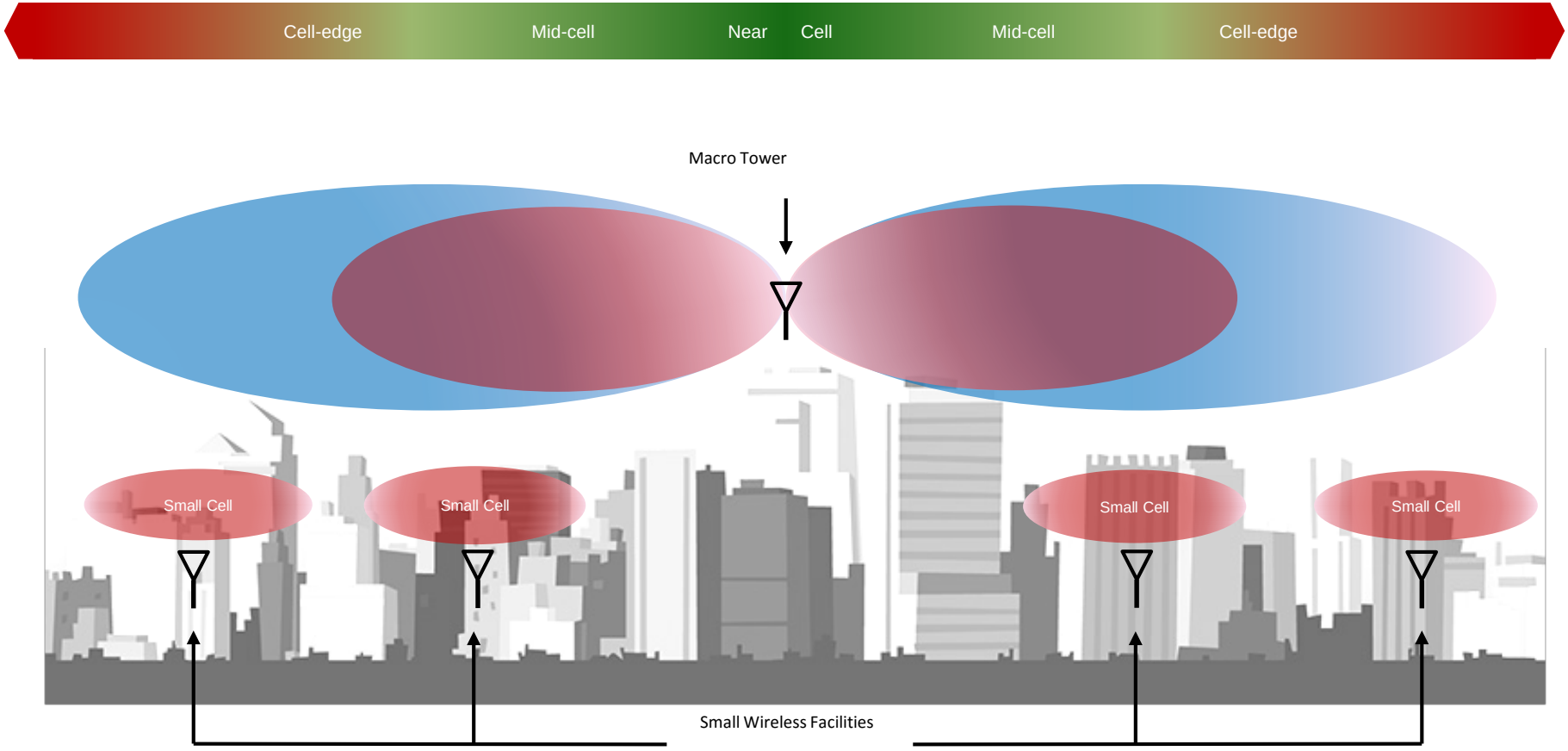
THE MOST INCREDIBLE THING
WE'VE ENGINEERED IS OUR TEAM

Macro vs. Small Cell

- **Macro - Umbrella Coverage**
  - Traditional towers and roof top installations
  - Ground mounted equipment
  - Signal covers large geographical area
  - Provides overlay network; emergency power backup

- **Small Cells-Capacity**
  - New smaller installations less than 50’
  - Pole mounted equipment preferred
  - Closer to customer, thus smaller footprint
  - Capacity offload for network; no emergency power backup

Macro / Small Cell Network



Small Cell Buzz Words

- **Next Industrial Revolution!**

- **5G –** The protocol for the operation of a radio.
  - Lightning fast speeds for data and video

- **IoT – Internet of Things – 30 billion** devices by 2020:
  - **AV –** Autonomous Vehicles
  - **ITS –** Intelligent transportation systems
  - **Telemedicine-** Monitoring capabilities

- **Smart Cities-** Ultimate goal.

Benefits

- Education
- Health Care
- Public Safety
- Job Creation
- Economic Development

What We Know Today…

- Technology is changing exponentially.
- Industry moving towards smaller and more compact equipment.
- **New technologies will not exist without wireless infrastructure; antenna locations and fiber!**

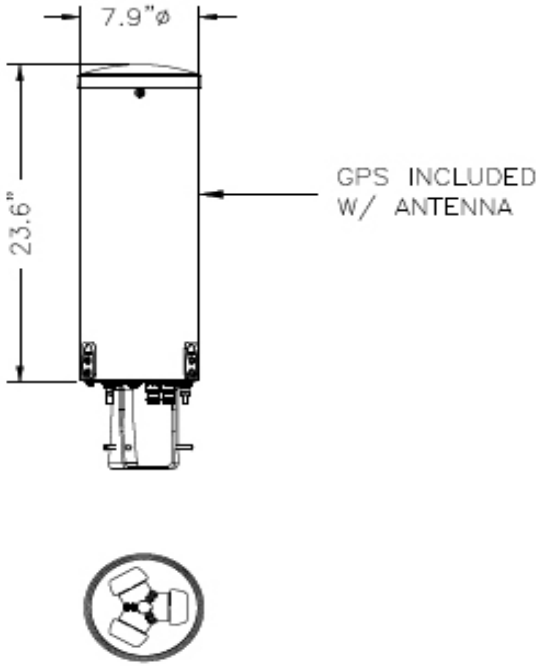
Why Public Rights-of-Ways?

- Close to the customers; businesses, residents and vehicular traffic.
- Similar types of installations.
- Numerous collocation opportunities.
- Access to fiber.
- Speed to market.

Small Cell Equipment

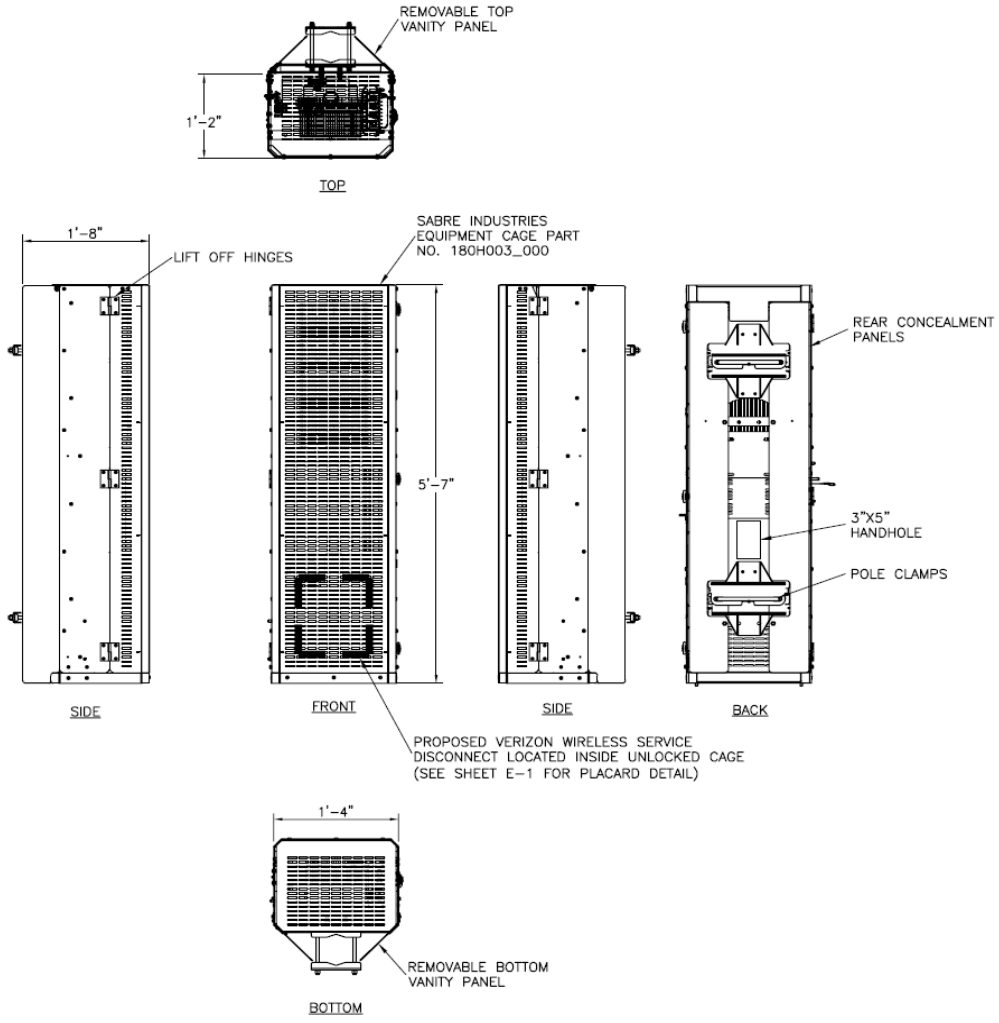
- **Antennas** – Broadcasts the wireless signal.
- **Equipment Cabinets**– Radios.
- **Coaxial Cables** – Provides connectivity from the radio equipment to the antennas.
- **Fiber Demarcation-** Connectivity to the network.
- **Power-** Disconnect and meter.

LTE Antenna Detail

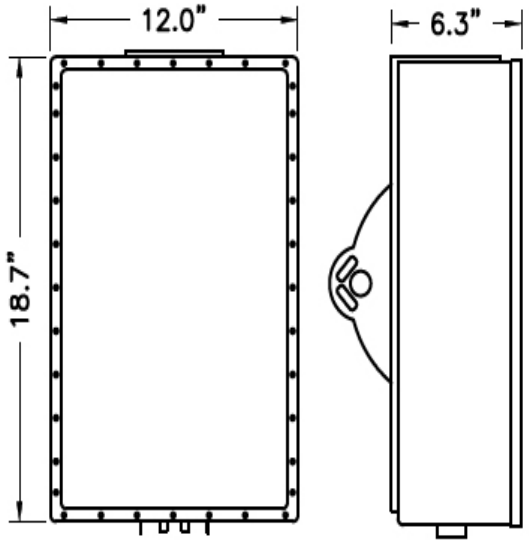


1 / A-1 COMMSCOPE VVSSP-360S-F
NTS

LTE Equipment Cabinet Detail

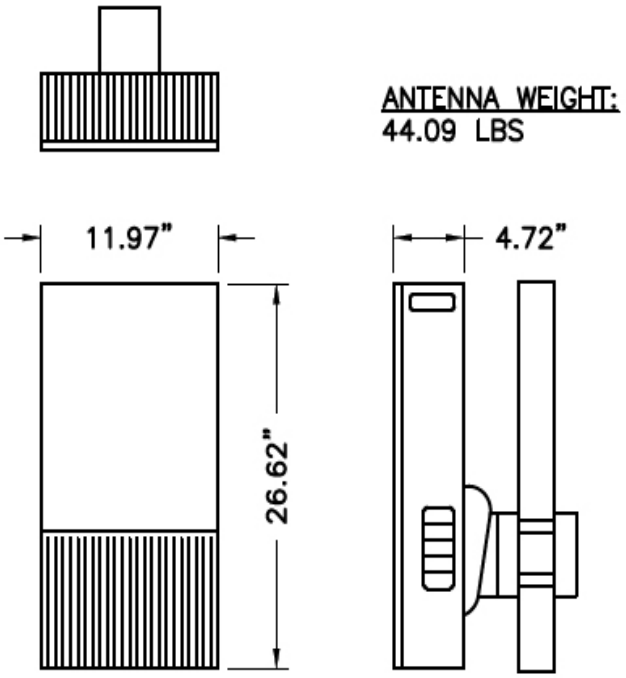


5G Devices



NOKIA 474214A AEUA 28 GHz RADIO UNIT
ANTENNA WEIGHT = 48.0 LBS (PER UNIT)

2 / D-1 NOKIA ANTENNA DETAIL
NTS



1 / A-1 NOKIA VZ-5GNR-28
NTS

Equipment Scenarios

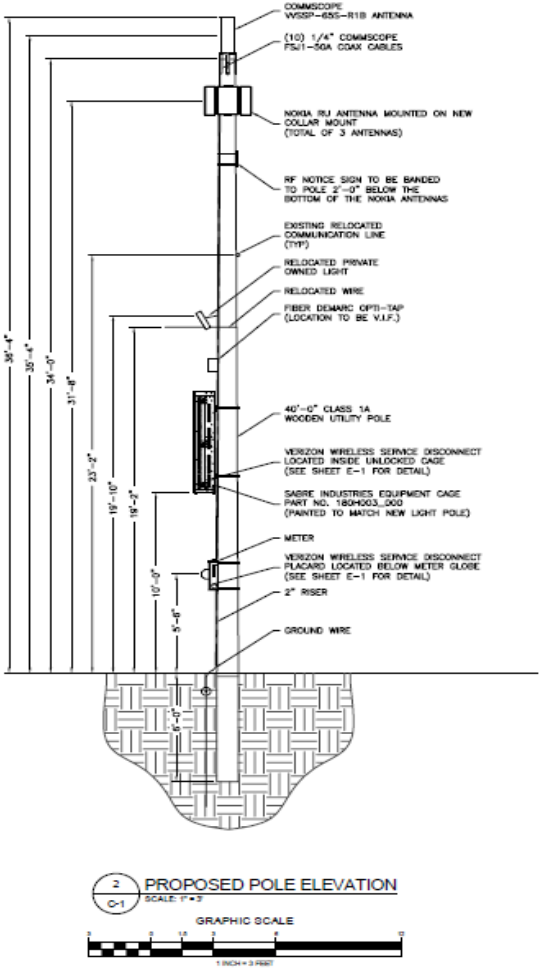
- **LTE**
  - Single or multiple antennas
  - Equipment cabinets
  - Electric meter base and disconnect
  - Fiber terminal
- **5G**
  - Antenna combined with equipment
  - Electric meter base and disconnect
  - Fiber connection
- **LTE & 5G Combined**
  - All of the above

LTE Small Cell on Utility Poles

Streetlight Objectives

- **Minimize New Structures:**
  - Leverage existing structures for collocations.
- **Partnership Opportunities:**
  - Replace old poles.
  - Upgrade and provide additional security lighting.
  - Enhance public safety- security camera mounts.
  - Smart City- create infrastructure for future:
    - Locations for kiosks and monitoring devices.
- **$0 Cost to City:**
  - Permittee will be responsible for all costs associated with the project- installation and operation of light.

Wood Pole Elevation



Wood Pole- LTE Only

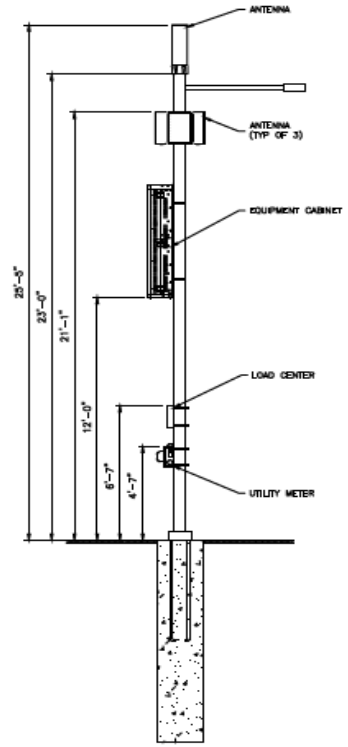
Wood Pole- LTE & 5G

Methodology- Aerial Service

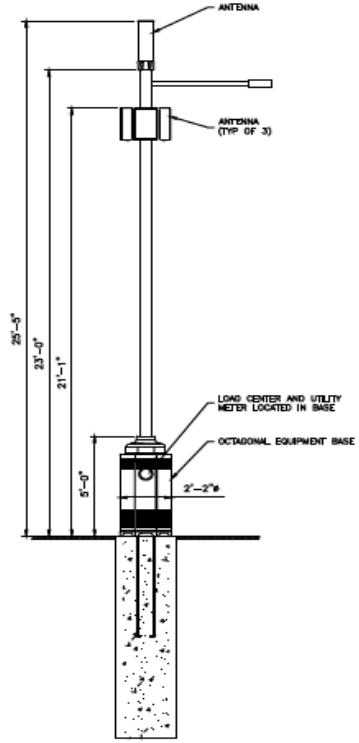
Streetlights with aerial electric service:

- Initially target **terminal** pole in the series.
- Existing aerial conductors will be terminated at the last pole adjacent to terminal pole.
- Permittee will replace the existing pole with new pole.
- The new pole will support the new small cell equipment and a new luminaire.
- Dominion service will be established at the new pole.

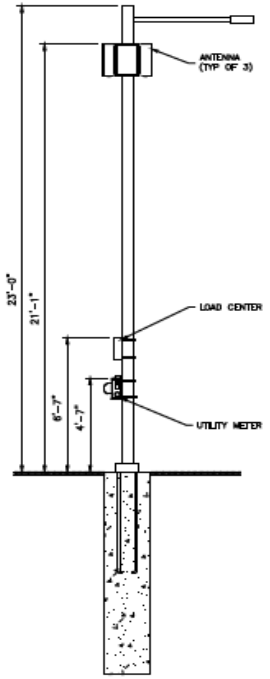
Metal Pole Elevations



1 CLASS A POLE w/ NO BASE
NOT TO SCALE



2 CLASS A POLE w/ OCTAGONAL BASE
NOT TO SCALE



3 CLASS B POLE
NOT TO SCALE

Metal Pole- LTE Only - Cabinet

Metal Pole- LTE & 5G- Cabinet

Metal Pole- LTE & 5G- Concealed Base

Metal Pole Streetlight Installations

Methodology- Underground Service

Streetlights with underground electrical service:

- Existing underground conductors will be spliced/terminated in an underground vault.
- Permittee will replace the existing pole with new pole.
- The new pole will support the new small cell equipment and a new luminaire.
- Dominion service will be established at the new pole.

New Wireless Support Structures

- **Add new structures where they makes sense:**
  - Target locations that could benefit from added infrastructure.

- **Opportunities:**
  - New poles for security lighting and security camera mounts.
  - Permittee will be responsible for all costs associated with the project- installation and operation.
  - Potential to embed infrastructure for future smart city technologies- kiosks and monitoring devices.

Security Camera

Light Pole Examples

Light Pole Examples

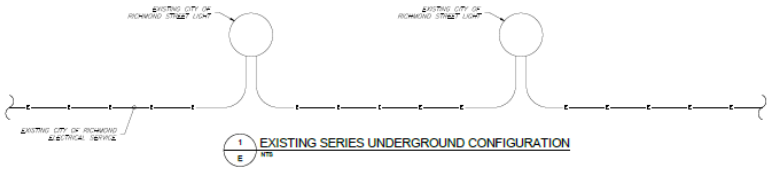
Light Pole Examples

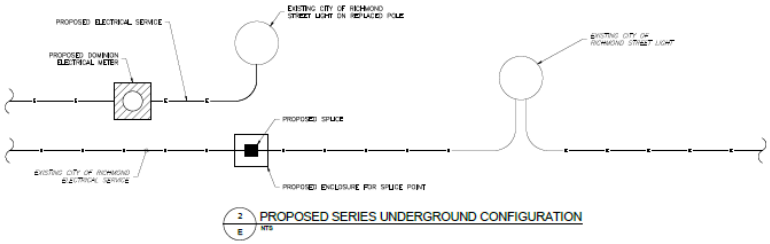
Existing Pole

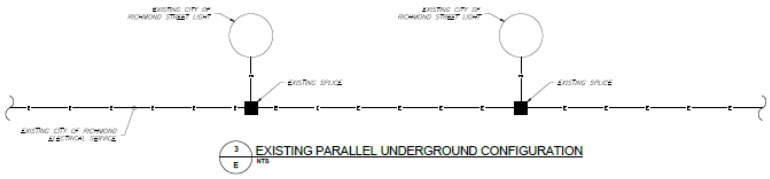
Proposed LTE and 5G Equipment

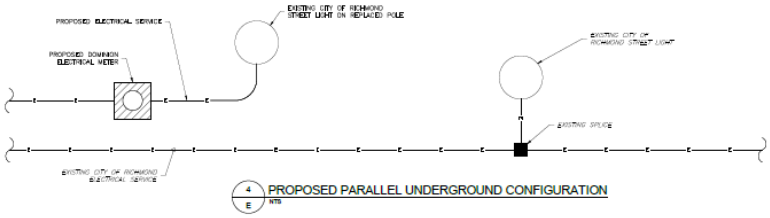
Proposed 5G Only Equipment

Wiring Configurations

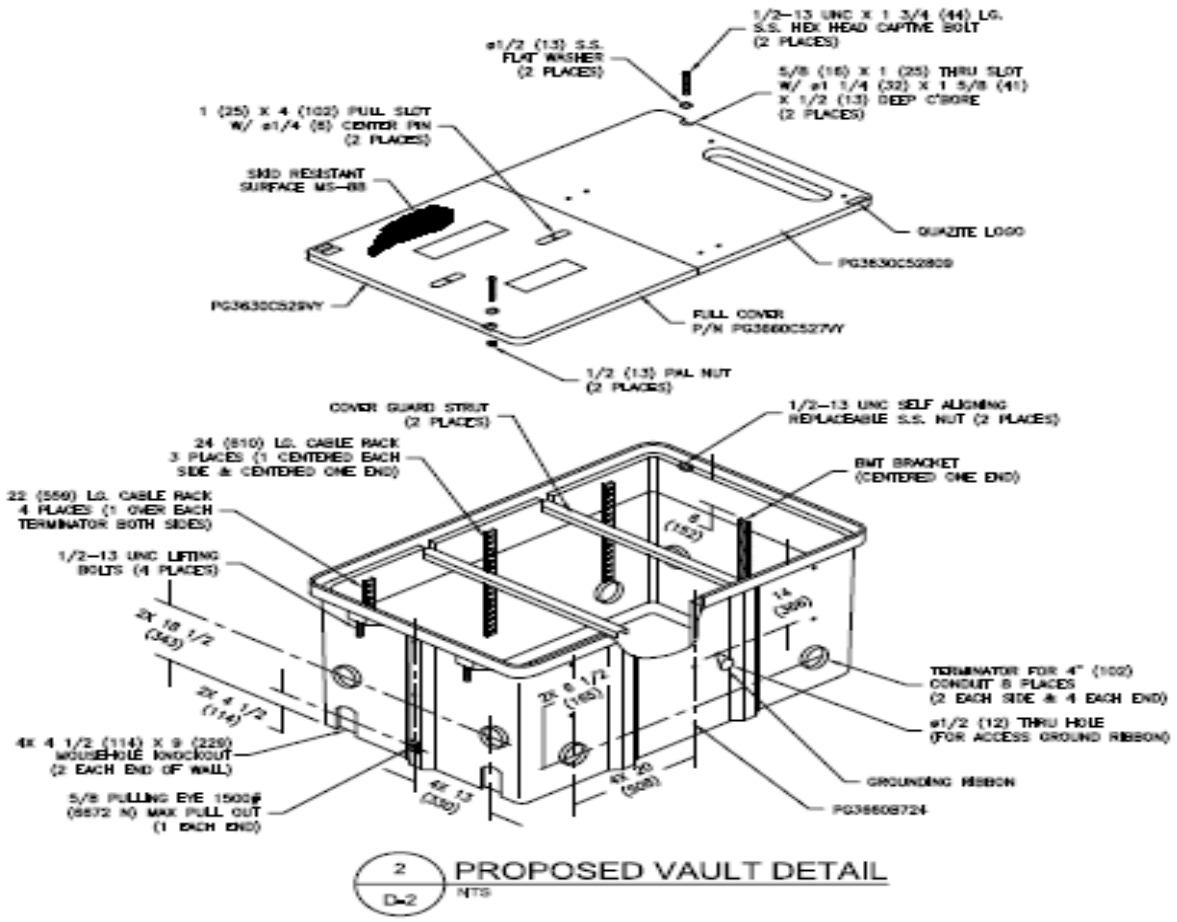








Vault Detail



2 / D-2 PROPOSED VAULT DETAIL
NTS

Topics for Discussion

- Ownership of the new pole?
- Existing pole returned to City inventory?
- Operation and maintenance of new pole?
- Depowering sequence?

Outstanding Opportunity

Questions

Marshall Pearsall
Wireless Infrastructure Consultant
KCI Communications
Marshall.Pearsall@kci.com
(804) 347-2572

AT&T Small Cells in the City of Richmond, VA

Enhancing our network to meet consumer demand today while preparing for the technologies and innovations of tomorrow.

January 2019

2019 - AGENDA

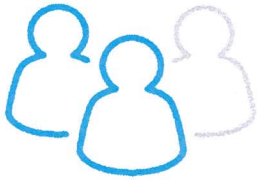
- LEGAL FRANCHISE AGREEMENT? W/ AT&T COVERS ATTACHMENTS AND NEW POLES
- 12 DIFFERENT PROVIDERS CURRENTLY DRW

- **Overview**
  - Consumer use requires innovation and growth within the City of Richmond.
  - MACRO Approach no longer sufficient to meet demands
  - Small Cell provides an avenue to reach high density areas
- **The SMALL Cell Approach**
  - Smaller Footprint, Smaller Equipment
  - Smaller Visual Impact
  - Smaller Coverage Radius
- **An AT&T/City of Richmond Relationship**
  - Master Attachment Agreement Discussion
- **State and Federal Regulations**
- **Recap – Discussion – Action Items**

Innovation Driving Consumer On-Line Activity

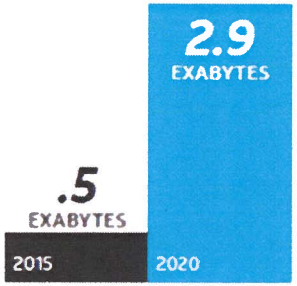
More Mobile

Over 2/3 of U.S. adults aged 25-34 were wireless-only in 2016.[1]



Mobile video traffic will soar – growing 5-fold from 2016 to 2021.[4]

Mobile traffic projected to increase in the U.S. over *six-fold*.[2]

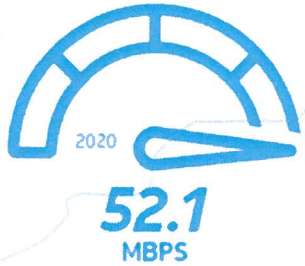


Mobile speeds will *jump* from 6.59 Mbps in 2015 to *20.9 Mbps* in 2021.[3]

By 2020, mobile data traffic in the U.S. will be equivalent to 6x the volume of the entire U.S. Internet in 2005.[5]

More Speed & Coverage

Average fixed broadband connection will *double* in speed.



Americans with access to 25 Mbps fixed broadband download speeds.[6]

More Devices

4.1 Billion devices in the U.S. (up from 2.3 Billion in 2015)

Virtual Reality Headsets (WORLDWIDE):

2016 **18 M**

2021 **100 M**

	Smartphones:	***TVs:***
2015	**233.5 M**	**504 M**
2020	**361.2 M**	**682 M**

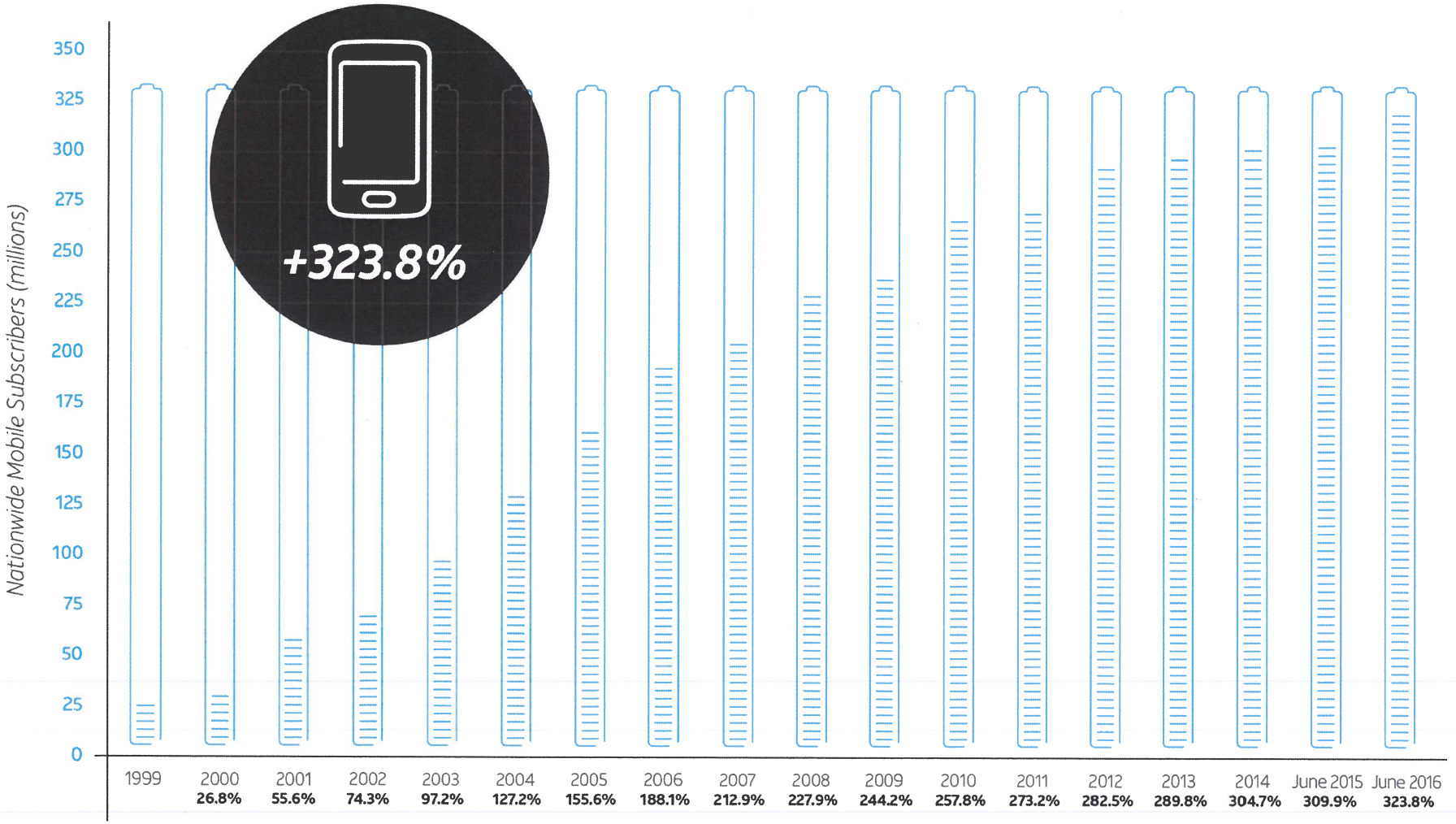
By 2020, there will be 12.3 networked devices for *every person* in the U.S.

More Applications

IP Video will be 85% of all IP traffic.[7]

Internet gaming will explode, growing 8-fold by 2020.[8]

The number of mobile subscribers in the U.S. has increased by more than 4x since 1999



Source: FCC Local Telephone Competition and Voice Telephone Services Reports

The Way Virginia Communicates is Changing...

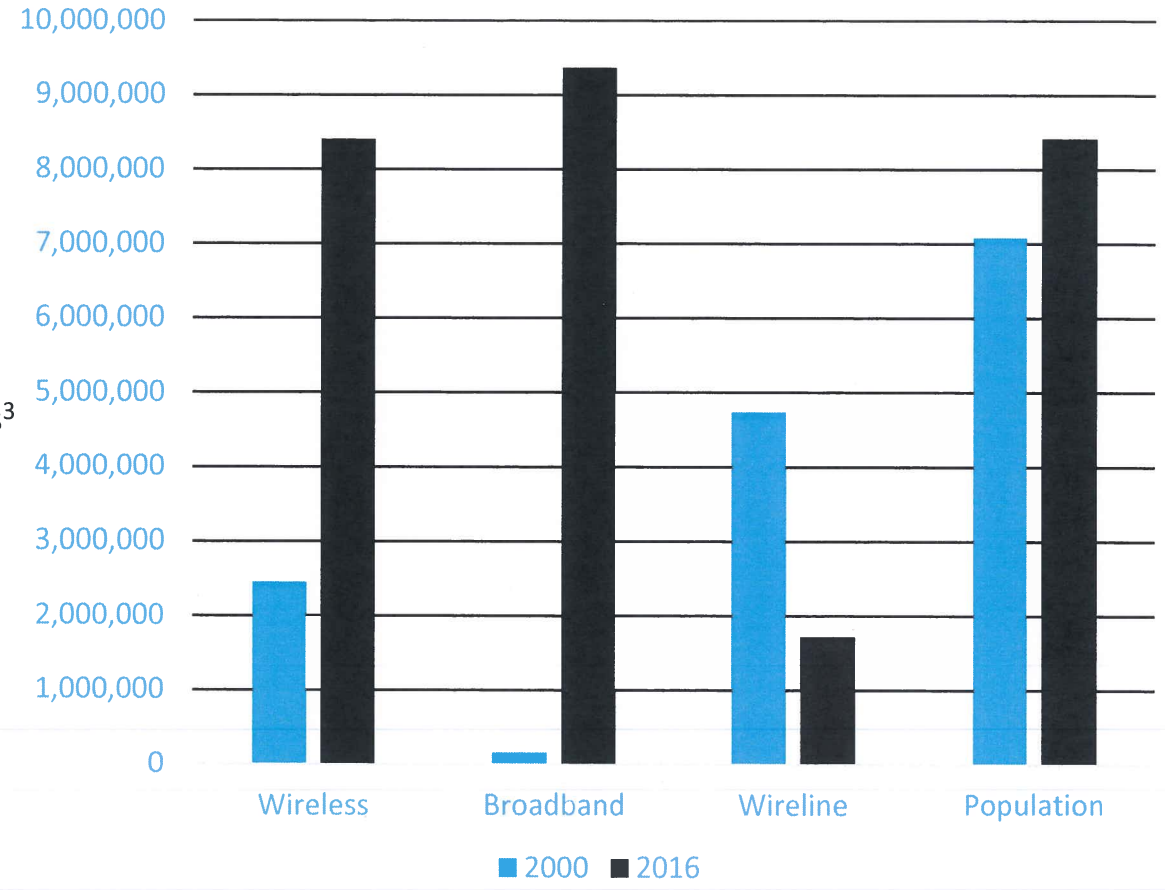
From 2000-2016,
Virginia has seen:

243% increase in wireless phone subscribers[1]

6,592% increase in broadband subscribers[2]

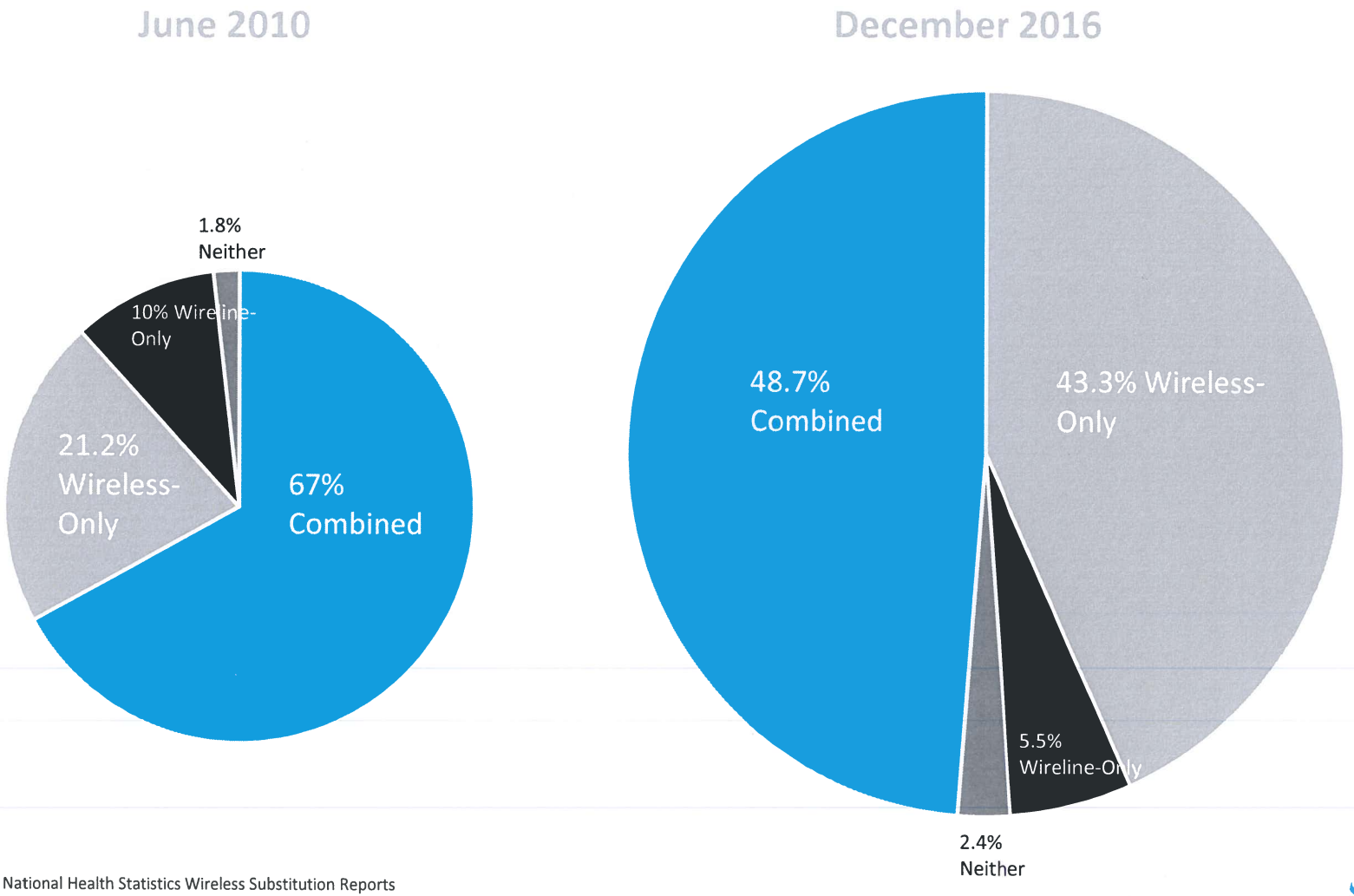
64% decrease in switched access lines[3]

19% increase in population[4]



1 FCC Local Competition Report May 2001 (as of 12/31/00), Table 9; FCC Voice Telephone Services Report February 2018 (as of 12/31/16), Supplemental Table 1.
2 FCC High-Speed Services for Internet Access: Status as of December 2000 (Table 7); FCC Internet Access Service Report February 2018 (as of 12/31/16) *Connections/lines over 200 Kbps.
3 FCC Local Competition Report May 2001 (as of 12/31/00), FCC Voice Telephone Services Report April 2017 (as of 06/30/16), Supplemental Table 1.
4 U.S. Census Bureau Quick Facts 2016 (July 1) Estimate Nevada; U.S. Census Bureau Nevada 2000.

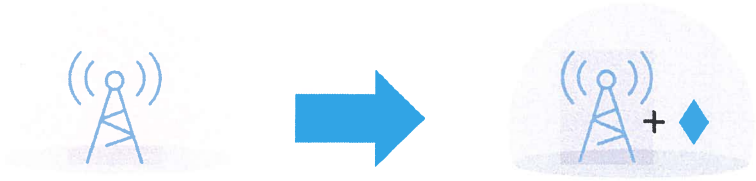
Growth of Wireless-Only Households in Virginia[1]:



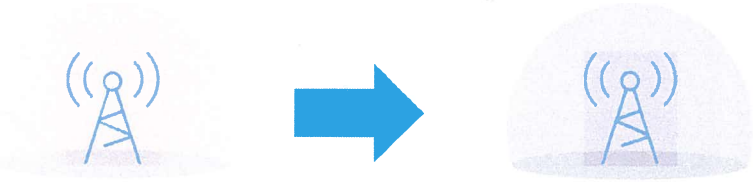
1 CDC National Health Statistics Wireless Substitution Reports

Ways to Increase Wireless Network Capacity

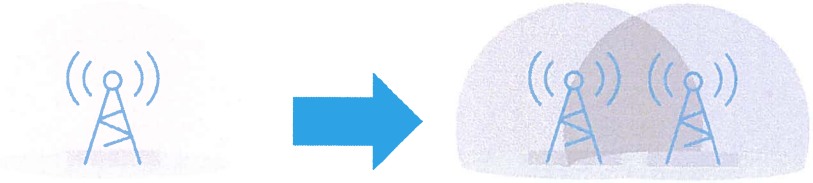
1. *Deploy more spectrum*
   - Spectrum is ***not readily available***



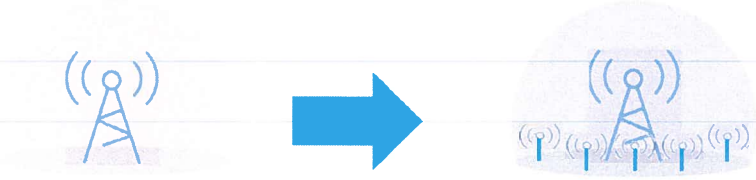
2. *Improve spectrum efficiency*
   - Repurposing existing spectrum
   - e.g., 3G carves for LTE



3. *Add more macro (cell sites) cells*
   - Optimal for low concentration areas



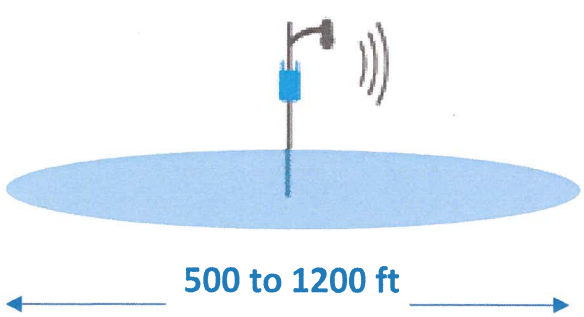
4. *Add more small cells*
   - Offloads surrounding macro sites



The footprint, or service area, of a site is determined by height and by frequency band

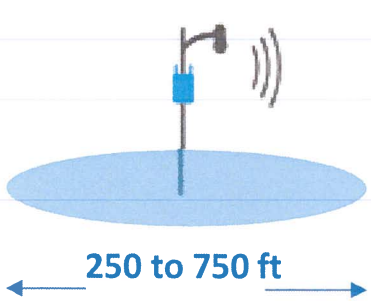
Macrocell (4G LTE)

The common form factor for wireless communication. Higher height and lower frequencies used result in the larger service area.



Current Small Cell (4G LTE)

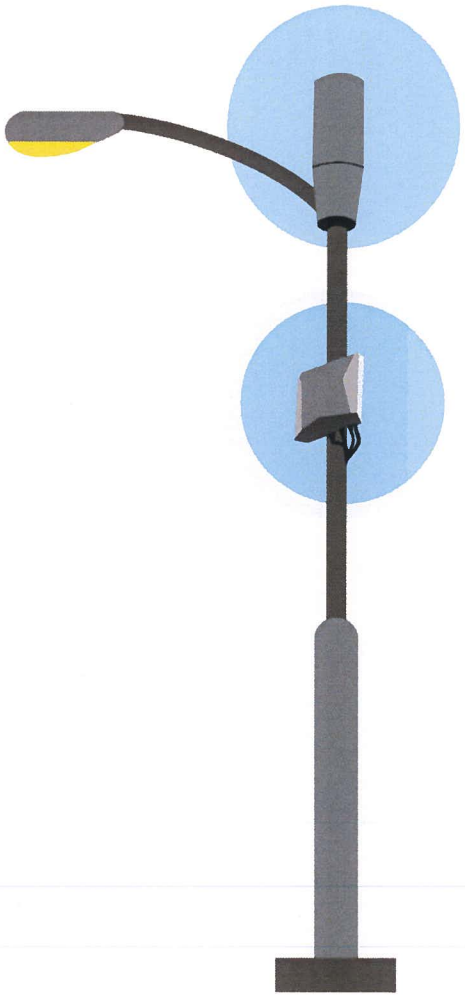
Uses the same frequencies as macrocells, in addition to utilizing unlicensed spectrum. Due to lower height, footprint is smaller. Increases capacity or coverage in target areas.



Future Small Cell (5G)

Very high frequencies enabled by future 5G technology will result in a smaller footprint, but can be used to meet the exponential increased capacity demand. These frequencies are not used for wireless service today.

- *Heights and service areas are approximations*
- *Small cell sites supplement vs. replace macrocell sites*



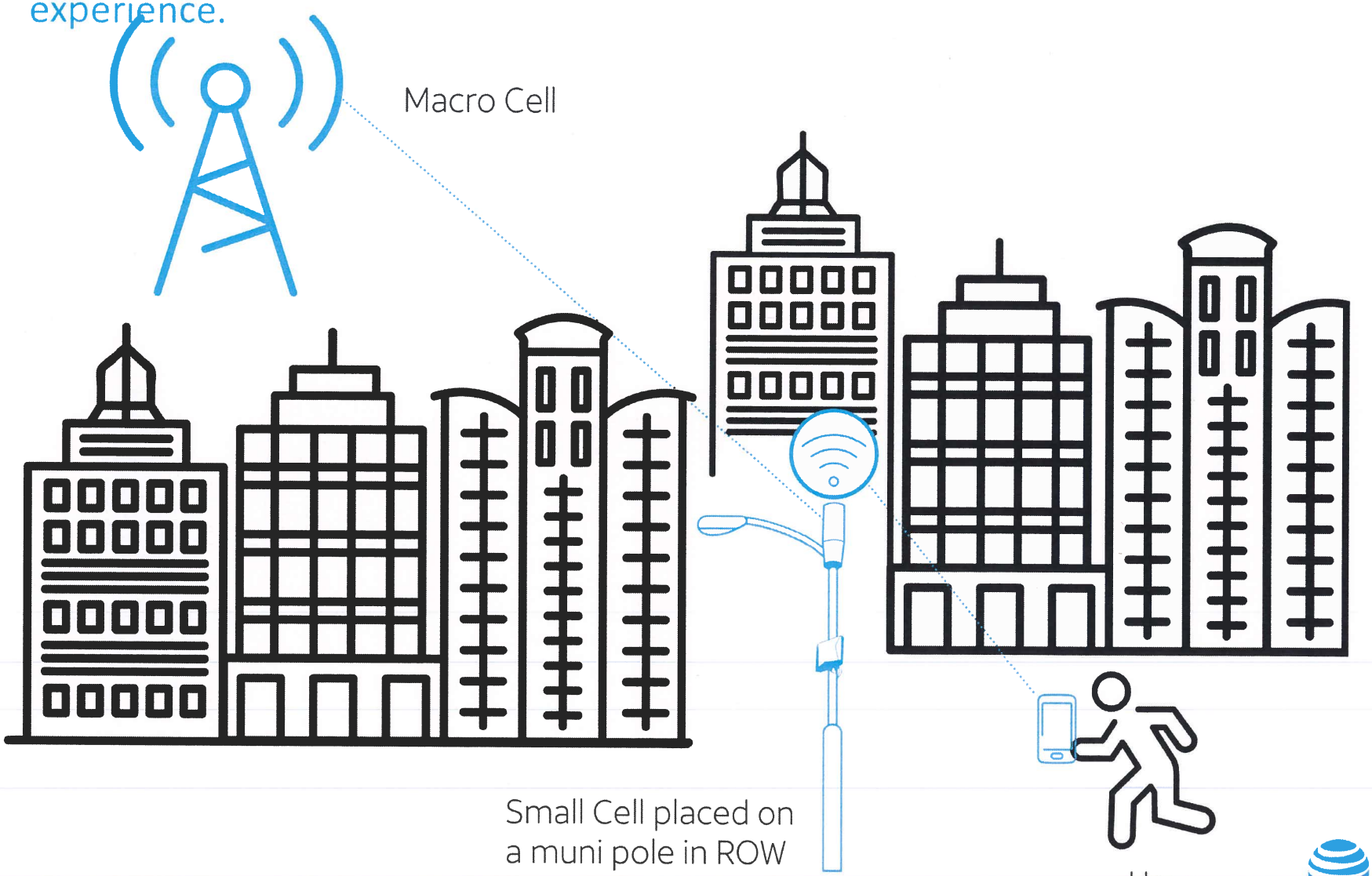
A new network architecture is needed

Small cells are flexible, targeted network solutions that cover a radius up to 1200+ feet and can be readily deployed to specific locations, including:

- Where customers are prone to experience connectivity issues
- Heavily populated areas that need more network capacity
- Areas that can't effectively be served by a traditional macro cell

This allows us to provide a better LTE experience today while also allowing us to prepare for the technologies of the future such as 5G, smart cities and new developments in the Internet of Things (IoT)).

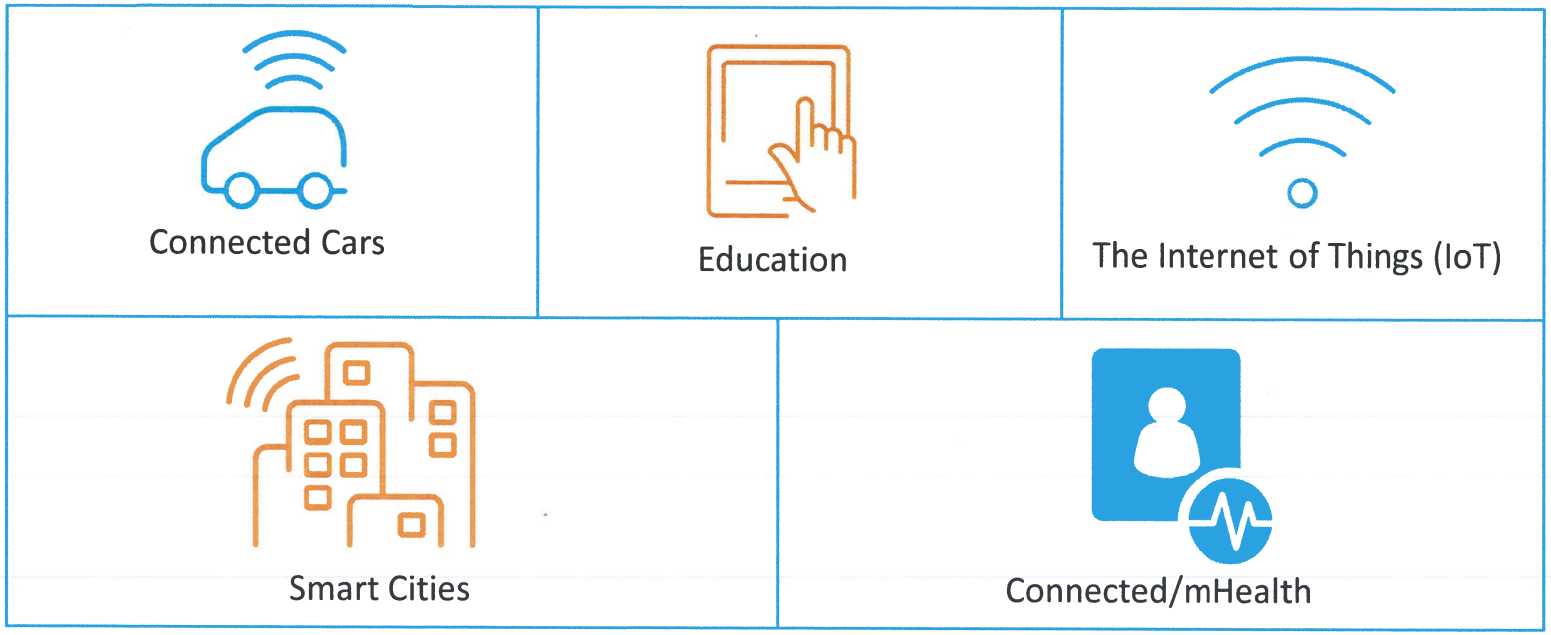
Small cells help to bring the network "closer" to its users to deliver increased data capacity, faster connectivity speeds and an overall better wireless experience.



Benefits of Small Cells to Consumers and Communities

- Small cells help to lay the foundation that is needed for 5G and to bring the next generation of technologies and services to market.

- By bolstering network capacity, more efficiently using spectrum and expanding access to faster mobile internet speeds, small cells help us prepare for the technologies of the future—such as 5G, smart cities and new developments in the Internet of Things (IoT).



Strong Partnerships

How the City Benefits

- ✓ Consistent source of revenue
- ✓ Minimize pole clutter in the ROW
- ✓ Design input and predictability
- ✓ Increased efficiencies during application and permitting process (e.g. staff resources)
- ✓ Improved communications infrastructure to support integrated solutions such as Smart Cities
- ✓ Longevity partner with AT&T

How AT&T Benefits

- ✓ Leader in developing innovation and Smart City technologies
- ✓ Successfully manages millions of connected devices
- ✓ Network enhancements to meet customer demand
- ✓ Secured connections – both network and connected devices
- ✓ Faster deployment
- ✓ Partner ecosystem that supports solution bundles (Utility, Transportation, Public Safety, Public Works)
- ✓ Increased efficiencies during application and permitting process (e.g. contractor resources)
- ✓ Supply chain predictability

AT&T Small Cell Antenna Design Examples

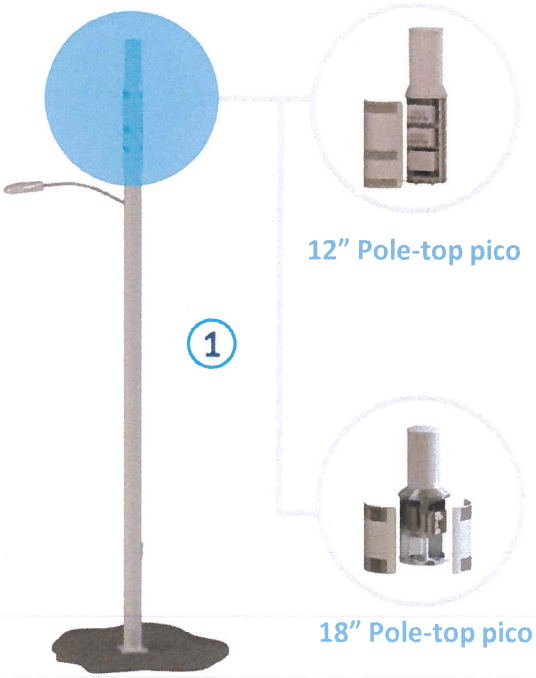
City of Richmond – Viable City Owned Structures

CITY OWNED POLES THROUGHOUT RICHMOND

- The most common design observed are various single arm metal light poles (green and silver) approximately 30 ft in height.

SMALL CELL CONCEALMENT SOLUTIONS AT A GLANCE

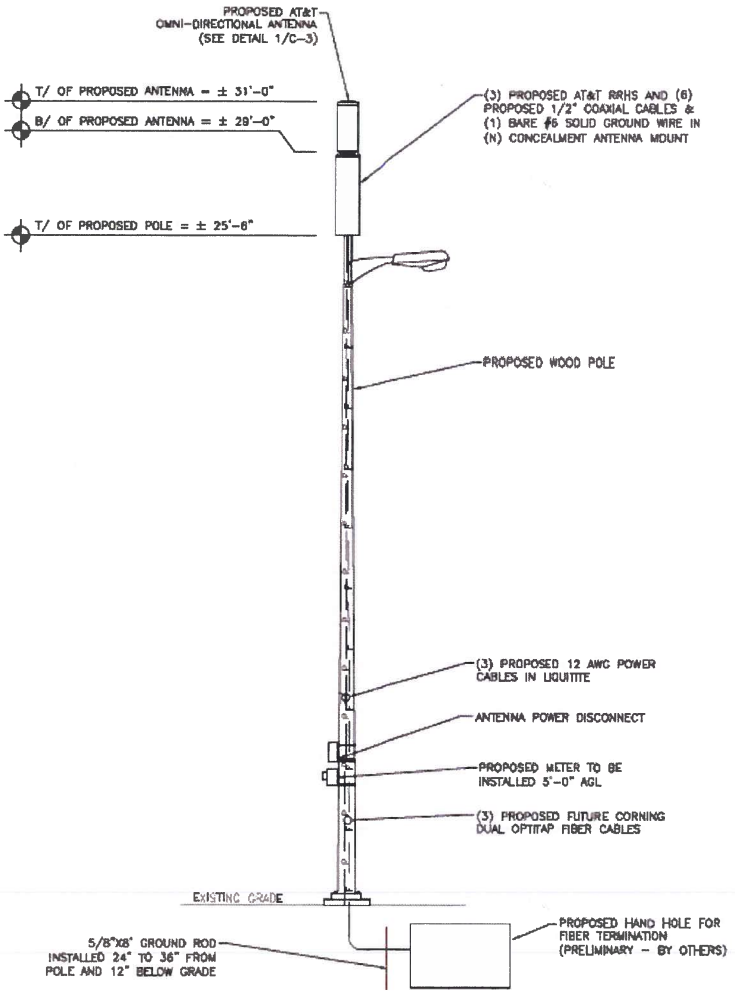
Pole-top solutions



Mid-pole solutions

Slide credit: Commscope

Examples of the AT&T Small Cell Equipment Options

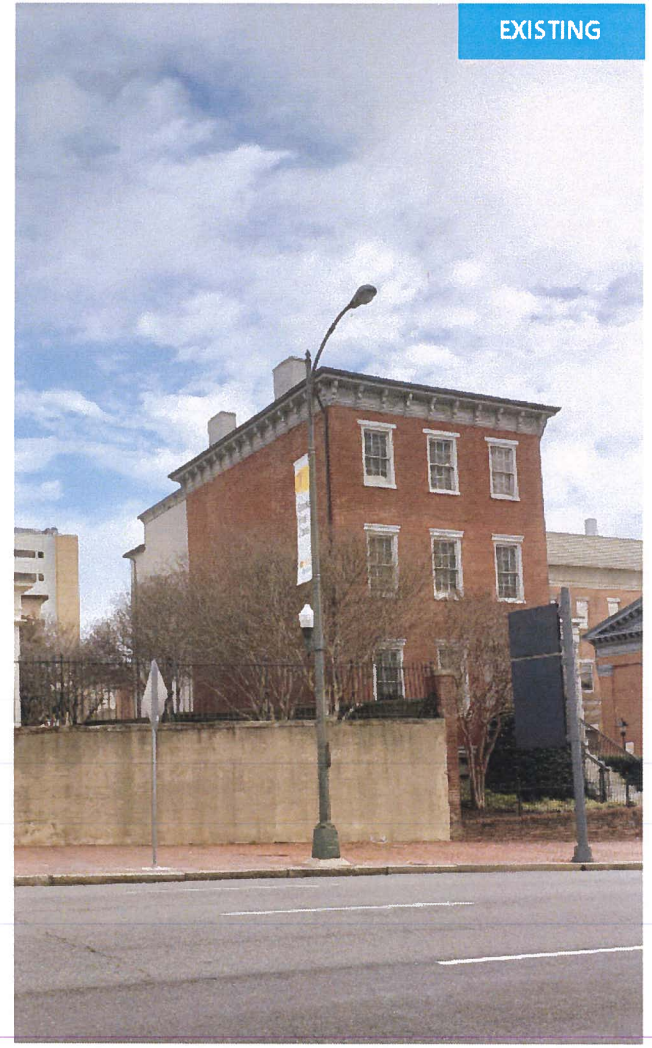


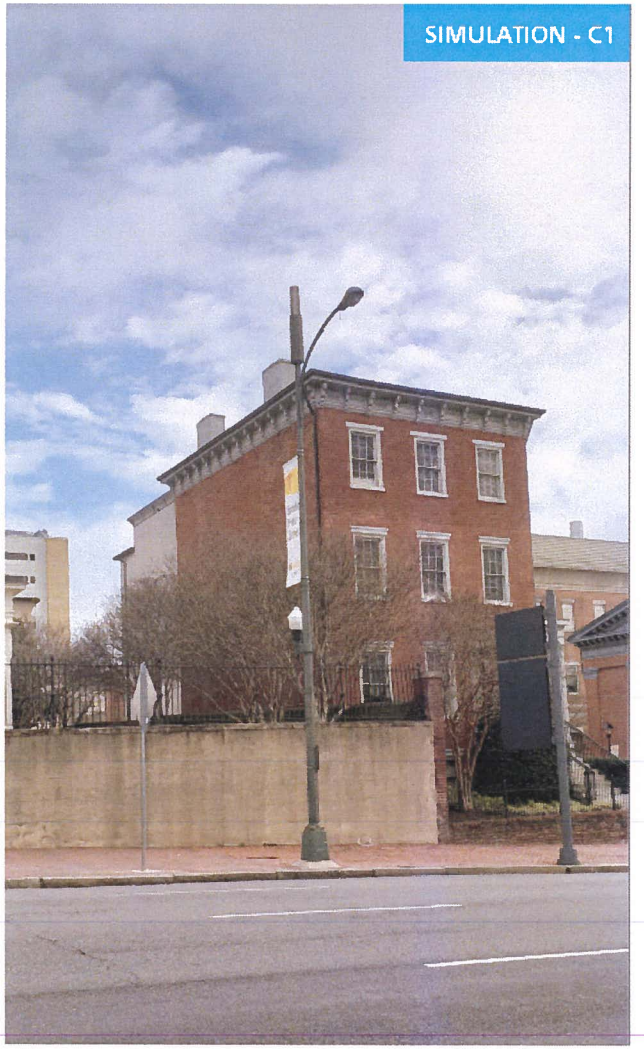
Small Cell Design Option

- Attachment to existing metal streetlight in ROW.
- Top mounted canister antenna and equipment shroud for components and associated cabling (power and fiber). Power disconnect and power meter mounted lower on pole. Requires in ground handhole adjacent the pole.

Examples of Proposed Small Equipment Options

Stealth Radio Enclosure Solution





Examples of Proposed Small Cell Equipment Options

Stealth Radio Enclosure Solution

Examples of Proposed Small Cell Equipment Options

Stealth Radio Enclosure Solution

Examples of Proposed Small Cell Equipment Options

BC architects engineers

JACOBS

at&t

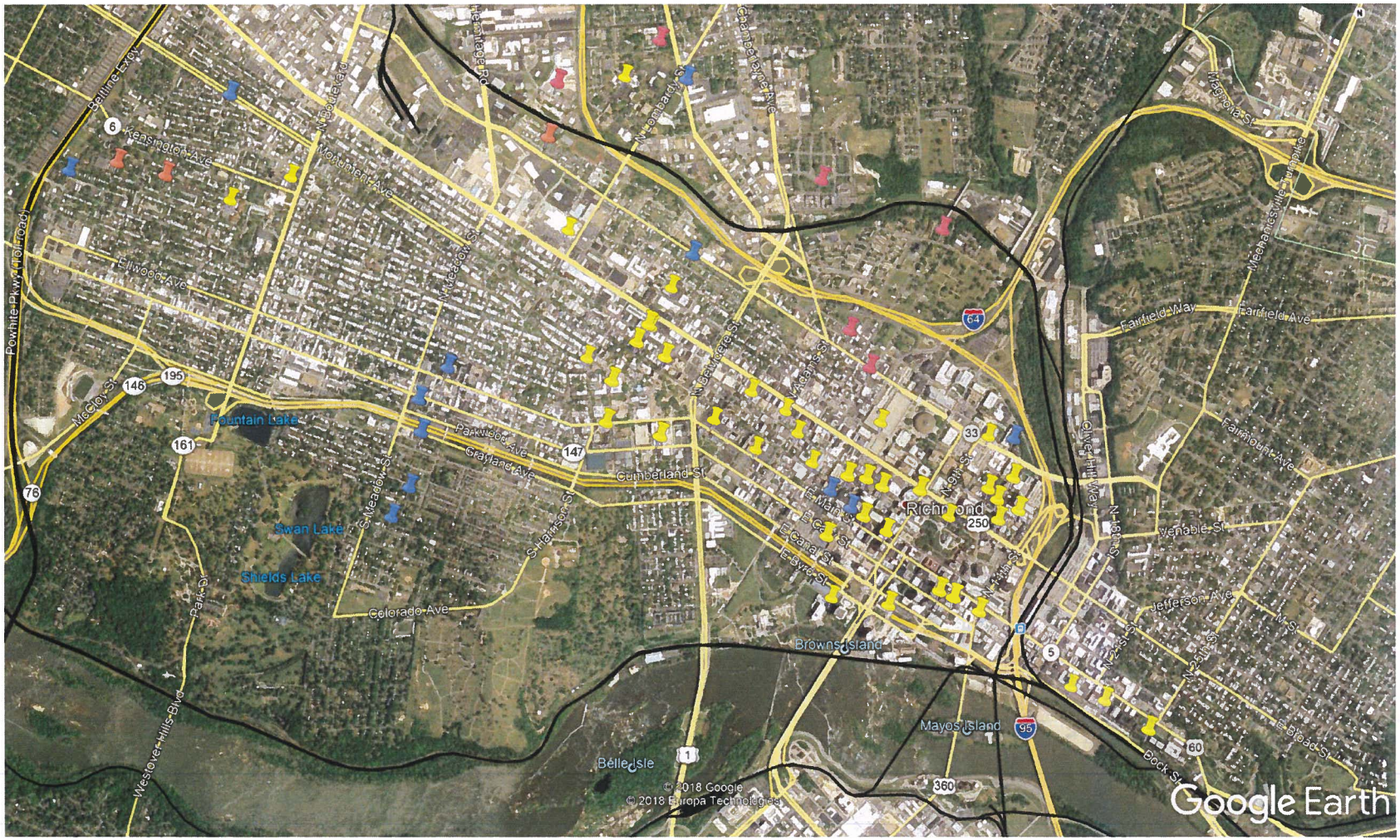
Antenna & Canister
on Pole Simulation

CRAN_RWSH_NORVA_032

City of Richmond

Areas of Interest for AT&T Network Capacity

The Overall City of Richmond Network Objective



City of Richmond First Wave Planned Locations – 64 sites

- First wave of AT&T scouted locations are in densely populated areas in both commercial and residential territories.

City of Richmond – Third Party locations

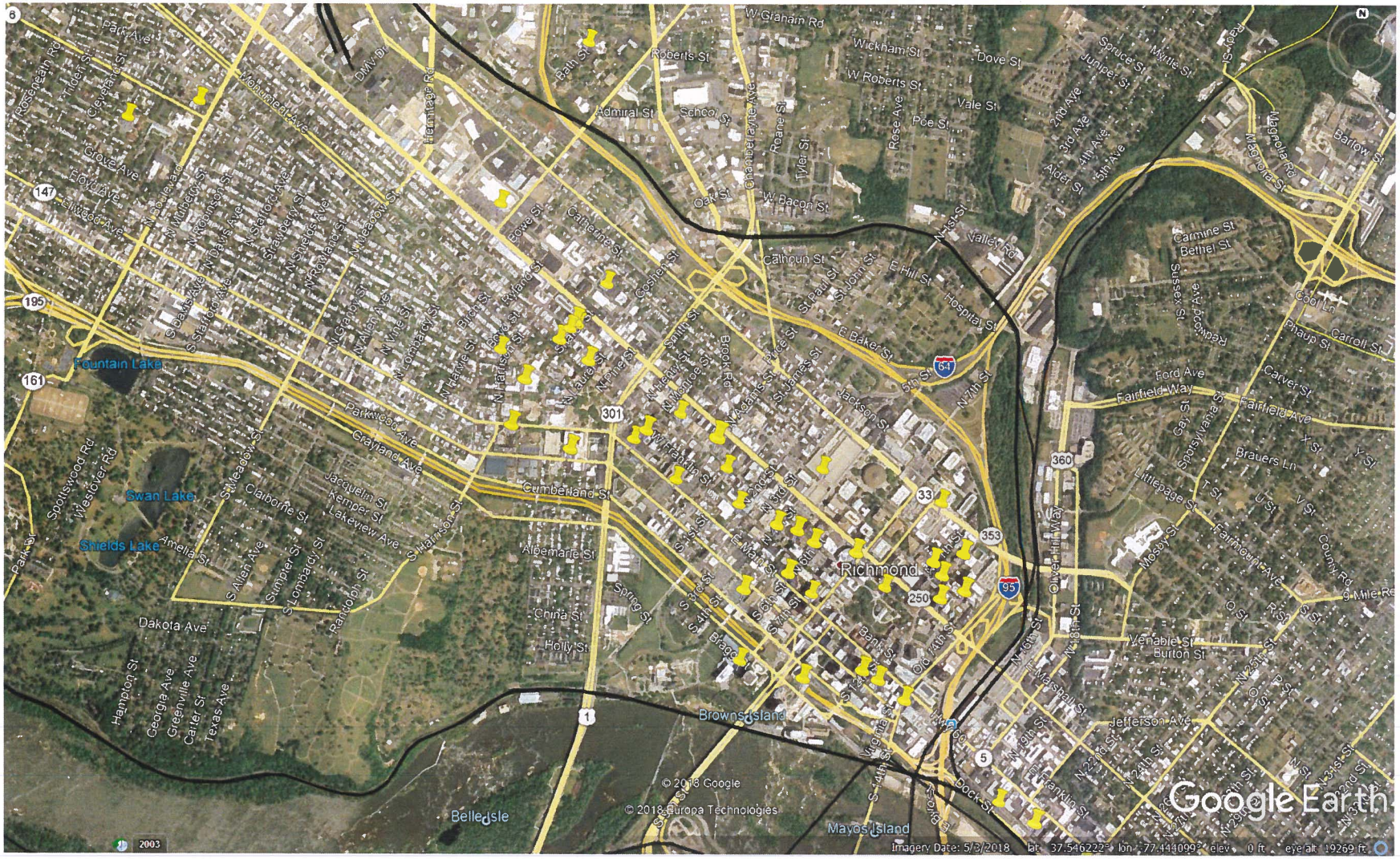
- Blue and red pins are Dominion and Verizon attachment locations
- Pink pins are proposed Department of Public Utilities wooden poles

Examples of the AT&T Small Cell Equipment Options

Small Cell Design – Wood Utility Pole

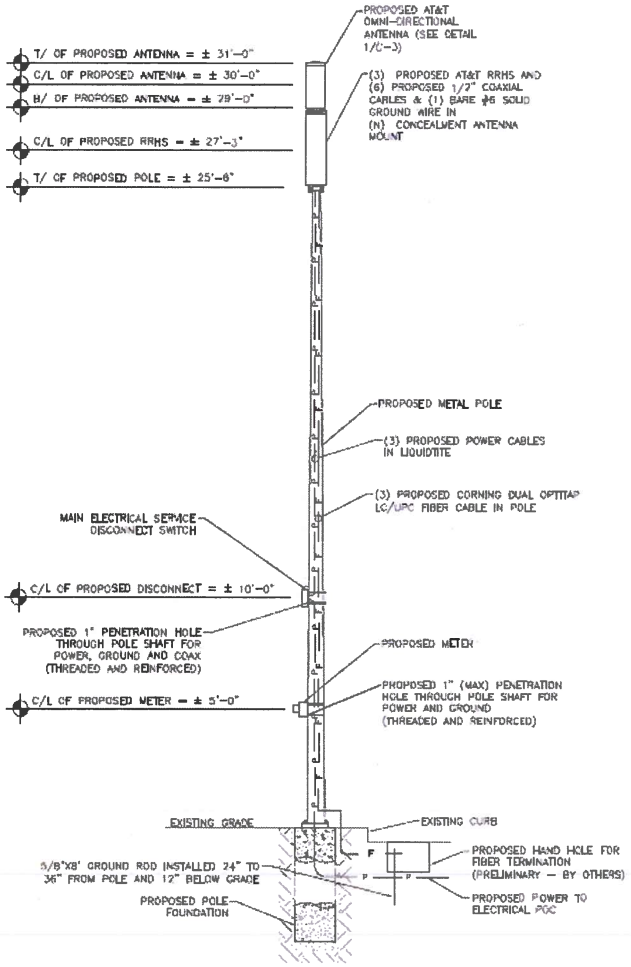
- Most commonly used in areas where these types of poles are abundant. New wooden poles are also an option where there aren't suitable pole options to collocate on.

City of Richmond – Proposed New Poles



- Yellow pins are proposed new pole locations within the right-of-way
- There are City owned structures available within proximity to most of these proposed locations.

Examples of the AT&T Small Cell Equipment Options



Small Cell Design – New Pole

- This pole design will most commonly be used in areas where attachments are not possible or viable. New wooden poles are also an option where there aren't suitable pole options to collocate on.

How Does the City of Richmond Get There:

Let's Work Together

Step 1

- Circulate Master Attachment Agreement (MAA) Template which includes work in the county right-of-way
- Compile departmental feedback

Step 2

- Work session between internal staff and AT&T
- Incorporate revisions

Step 3

- Fully execute MAA
- Deploy streamlined process

Attachment Agreement Discussion

Terms that help facilitate network growth

- **Term Length**

  A longer term length benefits the Municipality by

  - Ensuring a greater revenue income rate.
  - Establishing secured standards and processes with the wireless carrier.
  - Being one of the first jurisdictions with the new faster data speeds of the new technology. AT&T benefits by ensuring our customers of the most optimized network.
  - Suggested initial term of 10 years with 4 successive 5 year renewal terms.

- **Fees**

  Benefits of a set fee standard

  - Allows for the Municipality to plan and account for a standard base of incoming generated revenue.
  - Allows the wireless carrier to appropriately plan for future waves of network upgrades throughout the county by exactly knowing the rates.
  - A fixed escalator will allow both parties to account and plan for the increased revenue.
  - Application fees, pole attachment rental fee and ROW fees to also be standardized.

Attachment Agreement Discussion (continued)

Terms that help facilitate network growth

• Application Standards

Terms for a specific small cell application that would benefit both carriers and jurisdictions

- Covering the specific needs and requirements of the municipality rules.
- Reasonable review timeline for the applications (typical is 10 days for application completion confirmation and 45 days for review approval/rejection).
- Bulk submission for multiple antennas is preferred to minimize an influx of submitted/reviewed applications by municipality staff.
- Application for attaching to existing structures and new structures in the right-of-way.

• Access for Modifications

- AT&T will be allowed to make non-visually impacting modifications and/or repairs without additional city planning review.
  - This will minimize unnecessary strains on municipal staff reviews for maintenance work.
  - Also allows AT&T to attend to emergency outages in a timely manner.
- 24/7 access for installation, maintenance, repair, replacement, removal or modification to equipment.

Attachment Agreement Discussion (continued)

Terms that help facilitate network growth

- **Relocation**
  - AT&T will work with municipality if the structure needs to be relocated.
  - Municipality will work with AT&T on a suitable location that works for both parties.
  - Advanced notice required in order for AT&T to maintain network stability.

- **Applicable Law and Change of Law**
  - AT&T shall abide in accordance to the laws of Virginia.
  - Change of Law - in the event that any new law is released that affects either Party, then there is opportunity to amend the part of the agreement that is affected by the new law. The remaining terms of the agreement will remain in effect.
  - The Municipality will allow AT&T the ability to operate, maintain, repair, modify and remove the Wireless Installation during the renegotiation stage.

State Legislation – Virginia Acts of Assembly 2018

Chapter 835

§ 15.2-2316.3

"An Act to amend and reenact § 15.2316.3 of the Code of Virginia and to amend the Code of Virginia by adding sections numbered 15.2-2316.4:1, 15.2-2316.4:2, and 15.22316.4:3, relating to zoning for wireless communications infrastructure."

- ✓ *"The installation or construction of a new structure that is not more 50 fee above ground level, proved that the structure with attached wireless facilities is (i) not more that 10 feet above the tallest existing utility pole located within 500 feet of the new structure within the same public right-of-way or with the existing line of utility poles; (ii) not located within the boundaries of a local, state or federal historic district; (iii) not located inside the jurisdictional boundaries of a locality having expended a total amount equal to or greater than 35 percent of its general fund operating revenue, as shown in most recent comprehensive annual financial report, on undergrounding projects since 1980; and (iv) designed to support small cell facilities; or*
- ✓ *"The co-location on any existing structure of a wireless facility that is not a small cell facility"*

FCC 5G Small Cell Deployment Order – Effective 1/14/2019

Summary of FCC Declaratory Ruling and Third Order

State and Local Fees

Fair and reasonable compensation to recover a reasonable approximation of state or local governments' actual costs

- **Non-recurring Fees**
  - $500 including application with up to five (5) small wireless facilities
  - $100 for each additional small wireless facility beyond five (5)
  - $1,000 for a new pole
- **Recurring Fees**
  - $270 annually per small wireless facility

NEW FEES

Shot Clock

- **Timelines**
  - 60 days for review of application for collocation using an existing structure
  - 90 days for review of application for attachment using a new structure
  - 10 days from submission to determine whether application is incomplete
- **Batched Applications**
  - Same timelines also apply to batched applications

NEW REVIEW CLOCK

Aesthetics

- **Requirements**
  - Reasonable
  - No more burdensome than those applied to other infrastructure deployments
  - Objective and published in advance

* LOOK AT PEGGED POLES TO DETERMINE STRAIGHT SCENARIOS

* ENERGOV SMALL APPLICATION LIVE, IS DPU ON THAT REVIEW

MOVING FORWARD…

QUESTIONS

&

ACTION ITEMS