From:	Anthony Jones
To:	Dottie Franey; Matthew Holdren; Robert Priestas; Bonnie Gard; Michael Blackford; Kayla Holbrook; Rory Gaydos
Subject:	FW: Follow Up
Date:	Wednesday, June 08, 2016 4:43:38 PM
Attachments:	Wireless FAQs_05162011.pdf

Hello everyone,

Here is some feedback that we have received regarding our proposed changes to the cell tower code.

Kayla: can you please make sure that the Planning Commission gets this as part of their review.

Thanks

ANTHONY JONES, CECD
Director
Planning & Development

CITY OF GAHANNA

200 S. Hamilton Rd.
Gahanna, Ohio 43230
614.342.4020
614.342.4120(fax)
anthony.jones@gahanna.gov
www.Gahanna.gov
Twitter@CityOfGahanna

From: Ben Hartings [mailto:bhartings@cellsitecapital.com]
Sent: Wednesday, June 8, 2016 4:21 PM
To: Anthony Jones <Anthony.Jones@gahanna.gov>
Cc: Christopher Bland <chris@cellsitecapital.com>
Subject: Follow Up

Anthony,

As it relates to feedback, see below:

1. Pages 2-5: Alternative Structures, Backhaul Networks, Cable Microcell, DAS, Monopole, etc. - and the all encompassing definition of "Towers": I would more distinctly delineate between definitions using industry terminology. This attached document from Palo Alto, while dated to 2011, does provide a framework for this delineation. We can be of assistance if you need definition updates from our team.
http://www.cityofpaloalto.org/civicax/filebank/documents/27109

2. Page 8 section (d) - The written description of how it fits into the network if a third party infrastructure firm is facilitating the build may be difficult to accommodate.

3. Page 9 section (b) - Color and finish of towers I would leave to discretion of committees and not define color. Technology may change and permit other structural stealth modifications.

4. Page 10 section 6. - Good exclusion for city water tanks. Any other structures greater than height requirements in place that should be added?

5. Page 11 Section 2. - Is a 300' setback reasonable for users in Restricted Institutional districts. Who are the potential users; does landmass accommodate such setback?

6. Page 13 section 7b - 10 year review may limit ability to finance infrastructure. It may be opening the door to shortcut doing it right the first time - having someone use cheaper structures.

7. Page 14 ART Review section (c) - May want to consider having a required third party review of all applications, whereby a CSC could review and provide guidance for a fee passed along.

8. Page 24 - space in section B of inspections between "City's Request"

I would consider adding a provision for location of meters and support equipment for small cells and microcells requiring concealment therein.

Good work.

Ben

Ben Hartings

Cell Site Capital, LLC
614-562-4063
Bhartings@cellsitecapital.com

Sent from my iPad

May 16, 2011

City of Palo Alto
Wireless Communications
Frequently Asked Questions

1. What are the different types of wireless communications facilities and what do they do?

   Commercial mobile radio services (CMRs) fall under the regulatory scope of the Federal Telecommunications Act (TCA) of 1996. The term "CMRs" covers traditional cellular services and newer broadband personal communications services and narrowband PCs as well as wireless point-to-point and point-multipoint services, common carrier microwaves and paging services. The types of CMRs that are of particular interest to Palo Alto currently include:

   a) Macrocell (pole and building mounted) antenna sites – A **macrocell** provides the largest area of coverage within a mobile network. Its antennas can be mounted on ground-based masts, rooftops or other structures and must be high enough to avoid obstruction. Macrocells provide radio coverage over varying distances, depending on the frequency used, the number of calls and the physical terrain. Typically they have a power output in tens of watts.

      The most common cellular sites in past and present applications and installations are referred to as "macro" cell sites, which include antenna facilities on poles (hidden or not) and on buildings. A single directional antenna can typically provide wireless communication service to an area encompassing a ½-mile radius (a coverage "ring"), though that area may be reduced by topography or other factors. Coverage rings are established with a slight overlap to avoid coverage gaps. Antennas are generally two to four feet tall placed on a pole (monopole, flagpole, inside a steeple, or faux tree, etc.) or mounted on the side or top of a building (see attached photos). Co-axial cable and service equipment is typically located at the pole's base, within a fenced enclosure. In some instances, two or more telecommunications service providers ("carriers") can mount antennas to the same pole (called "collocation") or on a rooftop. On a pole or faux tree, a 10-foot separation is typically needed between each carrier's antenna. Macro sites are generally preferred by carriers over other installations because of their broader coverage area and reduced maintenance for one site rather than many (see discussion of DAS below).

   b) Microcell antenna sites and DAS: - **Microcells** provide additional coverage and capacity in areas where there are high numbers of users, urban and suburban areas, for example. The antennas for microcells are mounted at street level, are smaller than macrocell antennas and can often be disguised as building features so that they are less visually intrusive. Microcells provide radio coverage over distances – typically between ¼ mile and 2/3 mile – and have lower output powers than macrocells, usually a few watts.

      Carriers sometimes choose to use a "microcell" antenna arrangement in lieu of the macrocell antennas. These smaller multiple antenna locations may be appropriate when the firm either has difficulty finding an agreeable property owner on a site adequate to install a pole or building mounted antenna, or when topography limits the coverage of a macrocell installation, or when the microcell installations are less intrusive visually or in a neighborhood than a larger installation. One type of microcell installation, referred to as an Outdoor Distributed Antenna System (DAS), is currently proposed for several locations in Palo Alto. The DAS antennas are typically located on utility poles in public rights-of-way (see attached photos). The poles usually have a height of 34 feet above grade (6 feet of the 40 foot pole is located below grade). The DAS generally

requires 5 to 15 times the number of antennas as one macrocell antenna to cover the same ½-mile service area. The coverage rings for each antenna are again situated to provide some overlap to ensure coverage is consistent and calls are not dropped in the transition area between DAS locations. Antennas are placed at the top of the utility pole in a single pole or double pole arrangement (see attached photos). Antennas may be shared ("neutral host") by multiple carriers rather than needing installation of separate antennas for each carrier collocating on a macrocell installation. Equipment boxes are needed for each carrier, usually shoe-box size enclosures in the "telecommunications zone" of the pole approximately between 18.5' and 22' above grade. The advantages of the DAS system are that the poles are usually shorter and are existing, and radiofrequency (RF) emissions are reduced, while the disadvantages are that the number of installations increases and the antennas and equipment boxes can still be visible, depending on the screening of the pole and the design of the antenna.

c) Indoor microcell sites: - **Picocells** provide more localized coverage. These are generally found inside buildings where coverage is poor or where there is a dense population of users such as in airport terminals, train stations and shopping centers. Picocells are generally for a building owner or tenant to serve its company's needs inside the building, including for business customers, such as the wireless service available inside Starbucks locations. **Femtocell** base stations allow mobile phone users to make calls inside their homes via their Internet broadband connection. Femto-cells provide small area coverage solutions operating at low transmit powers.

d) WiFi: WiFi, an abbreviation for "wireless fidelity," is a brand name for wireless networking technology based on IEEE 802.11 technology standards. Wi-Fi is used to link devices together, as well as to local area networks and the Internet through a variety of service providers. Wi-Fi is widely used in homes, businesses and school campuses, as well as public hotspot locations, such as cafes, hotels, airports and train stations. Wi-Fi can even be found installed on street lights, utility poles and aerial cable TV lines. Skyrocketing data usage on mobile networks is forcing the Wi-Fi issue; for consumers, Wi-Fi means faster download speeds on their mobile devices, and for Carriers, it is a method to reduce mobile network congestion while avoiding expensive cell site expansions. A recent example of this project type was for the Hotel President, 488 University Avenue where to WiFi antennas were approved.

2. Why are an extensive number of cell site applications in process or expected in the near future?

Wireless providers are ramping up to address two primary concerns: capacity (particularly for data) and speed (3G and 4G). The extent of data demand for smartphones and tablets is rapidly diminishing the capacity of the wireless system, so most carriers are expanding to increase their ability to provide data services. Palo Alto has unique coverage capacity needs due to the student population, high tech companies in the Stanford Research Park and downtown, and the general high level of tech sophistication in the community. The 4G and other speed upgrades also demanded by customers is further driving requests for new or upgraded installations. Areas of coverage gaps are identified by carriers to determine where new facilities are needed. To satisfy its coverage needs in Palo Alto, for example, AT&T targeted 14 cell tower locations last year before approaching the City with applications and evaluating the DAS alternative. AT&T has since dropped six of the macrocell locations, to be replaced by its DAS proposal for antennas on more than 90 utility poles. Other wireless providers, such as T-Mobile and Verizon, are also expected to approach the City for multiple new installation locations or collocations.

3. What criteria are set forth in the City's Comprehensive Plan and Zoning Ordinance related to wireless communications facilities?

   The City's Comprehensive Plan does not speak directly to wireless communications facilities. Comprehensive Plan Policy B-13, however, notes that the City should: "Support the development of technologically advanced communications infrastructure and other improvements that will facilitate the growth of emerging telecommunications industries." Other Comprehensive Plan policies are directed in general at protection of visual quality and neighborhood character of the Palo Alto community.

   Palo Alto Municipal Code Chapter Section 18.42.110 sets forth regulations for wireless communications facilities (WCF) in Palo Alto. The purpose statement specifies that WCFs should blend with existing surroundings and that building mounted WCFs and collocation facilities are preferred and encouraged. Each project is required to meet standard zoning requirements for the district with exceptions considered through the conditional use permit or architectural review processes outlined below. Exceptions include: (1) building mounted WCFs may extend 15 feet beyond the permitted building height in the zone; (2) stand-alone WCFs shall be no taller than 65 feet; and (3) stand-alone WCFs may encroach into the interior/street side and rear setback. In addition, the design of antennas must: (1) minimize visibility off site and be of "stealth" design; and (2) be architecturally compatible with the existing building (for building mounted antennas). There are also requirements for the associated equipment cabinets and enclosures and for removal of abandoned equipment.

4. What review processes are required for each and which departments are involved?

   PAMC Section 18.42.110(b) describes the review procedures for planning entitlements required for Wireless Communication Facilities (WCFs). A Conditional Use Permit (CUP) and Architectural Review are required for new WCFs, except that no CUP is required for building mounted WCFs that do not exceed the existing building/rooftop screening height, and for collocated facilities (architectural review is still required). To amend an existing CUP for a location to allow the expansion of a WCF, both a CUP and Architectural Review are required. The CUP process typically involves notice to neighbors, an opportunity to request a hearing before the Planning and Transportation Commission, and a final determination by City Council. WCFs must be installed and maintained in accordance with all the City's regulations (Planning, Building, Fire, Public Works, Utilities Departments) and with Federal Communications Commission (FCC) regulations to ensure the WCFs will not be detrimental to public health, safety, and welfare. In addition to discretionary review, Building Permits, including associated electrical permits, must be obtained. For installations on utility poles, appropriate approvals from the Utilities Department are required, and Encroachment Permits issued by Public Works may be necessary for work in a public right of way. License agreements may also be required.

5. Can the City require the wireless communications carriers to provide plans for all facilities in the City over some future period, such as one or two years?

   The carriers are very guarded with their plans for potential cell sites and generally consider them to be proprietary information. In 2010, City staff was involved in discussions organized by Joint Venture Silicon Valley, involving most of the relevant carriers and staff from the cities of Palo Alto and San Jose. Staff strongly suggested that such plans would be helpful to provide context and to better understand the carriers' needs. To date, only one carrier has met with staff to explain their plans for

the next year. Staff does not believe that the industry would put together a map synthesizing the needs of all of the carriers, though.

6. What review timelines are required by state or federal law for City review?

   Under federal law, applications for new cell towers (CMRs) must be approved or denied within a 150-day review period. In contrast, applications that involve the collocation of wireless facilities are subject to a 90-day review period. The period of review may be reasonably extended under certain terms, for example if the Director of Planning and Community Environment first determines that the application for a new facility is incomplete, or if the applicant agrees to extend the timeline.

7. What purview does the City have to deny or limit the use of telecommunications facilities?

   The City has the ability to regulate aesthetic issues related to telecommunications facilities, including factors such as height and setback. However, under federal law a local agency's wireless siting decisions cannot have the effect of prohibiting the provision of wireless service or unreasonably discriminating among wireless service providers. If a proposed facility is necessary to eliminate a significant service gap in wireless coverage, and the applicant can demonstrate that the proposed facility is the least intrusive feasible means of reducing the coverage gap, denial of the facility will be considered an effective prohibition. Under federal law the City may not regulate the placement, construction or modification of wireless communications facilities on the basis of the environmental effects of radio frequency (RF) emissions, so long as the facilities comply with the FCC regulations concerning such emissions.

8. What are radiofrequency emissions (RF)?

   Electromagnetic radiation consists of waves of electric and magnetic energy moving together (*i.e.*, radiating) through space at the speed of light. Taken together, all forms of electromagnetic energy are referred to as the electromagnetic "spectrum." Radio waves and microwaves emitted by transmitting antennas are one form of electromagnetic energy. They are collectively referred to as "radiofrequency" or "RF" energy or radiation. Extensive information about RF emissions, measurements and standards are available at: http://www.fcc.gov/oet/rfsafety/rf-faqs.html#Q1. Probably the most important use for RF energy is in providing telecommunications services. Radio and television broadcasting, cellular telephones, personal communications services (PCS), pagers, cordless telephones, business radio, radio communications for police and fire departments, amateur radio, microwave point-to-point links and satellite communications are just a few of the many telecommunications applications of RF energy. Microwave ovens are an example of a non-communication use of RF energy. Other important non-communication uses of RF energy include radar and industrial heating and sealing. There are also a number of medical applications of RF energy, such as diathermy and magnetic resonance imaging (MRI). [source: FCC]

9. What health risks are associated with radiofrequency (RF) emissions?

   RF energy is a type of non-ionizing radiation, like visible and infrared light. Non-ionizing radiation is low energy and should not be confused with the high-energy ionizing radiation, which has several possible biological effects.

   The quantity used to measure the rate at which RF energy is actually absorbed in a body is called the "Specific Absorption Rate" or "SAR." It is usually expressed in units of watts per kilogram (W/kg) or milliwatts per gram (mW/g). It is possible for biological effects to result from exposure to RF

energy, most commonly heating of tissue by RF, commonly referred to as "thermal" effects. Exposure to very high RF intensities can result in heating of biological tissue and an increase in body temperature. Tissue damage in humans could occur if RF levels were high enough to create heat so excessive that could not be coped with or dissipated by the human body.

At relatively low levels of exposure to RF radiation, *i.e.*, levels lower than those that would produce significant heating, the evidence for production of harmful biological effects is ambiguous and unproven. Such effects, if they exist, have been referred to as "non-thermal" effects. Even in studies where certain effects have been found, there has been no determination that such effects constitute a human health hazard. It is generally agreed that further research is needed to determine the generality of such effects and their possible relevance, if any, to human health. In the meantime, standards-setting organizations and government agencies continue to monitor the latest experimental findings to confirm their validity and determine whether changes in safety limits are needed to protect human health.

Studies have shown that environmental levels of RF energy routinely encountered by the general public are typically far below levels necessary to produce significant heating and increased body temperature. [source: FCC]

10. What health standards have been established for radiofrequency (RF) emissions?

Exposure standards for radiofrequency energy have been developed by various organizations and countries. These standards recommend safe levels of exposure for both the general public and for workers. In the United States, the Federal Communications Commission (FCC) has adopted and used recognized safety guidelines for evaluating RF environmental exposure since 1985. Federal health and safety agencies, such as the EPA, FDA, the National Institute for Occupational Safety and Health (NIOSH) and the Occupational Safety and Health Administration (OSHA) have also been involved in monitoring and investigating issues related to RF exposure.

The FCC guidelines for human exposure to RF electromagnetic fields were derived from the recommendations of two expert organizations, the National Council on Radiation Protection and Measurements (NCRP) and the Institute of Electrical and Electronics Engineers (IEEE). Both the NCRP exposure criteria and the IEEE standard were developed by scientists and engineers after extensive reviews of the scientific literature related to RF biological effects. The exposure guidelines are based on thresholds for known adverse effects, and they are intended to incorporate prudent margins of safety (typically 50 times the threshold level). In adopting the most recent RF exposure guidelines, the FCC consulted with the EPA, FDA, OSHA and NIOSH, and obtained their support for the guidelines that the FCC is using.

In addition, the NCRP and IEEE guidelines for maximum permissible exposure are different for different transmitting frequencies. For devices that only expose part of the body, such as mobile phones, different exposure limits are specified. The exposure limits used by the FCC are expressed in terms of SAR, electric and magnetic field strength and power density for transmitters operating at frequencies from 300 kHz to 100 GHz. The actual values can be found in either of two informational bulletins available at the FCC Web site (OET Bulletin 56 or OET Bulletin 65)." [source: FCC]

11. Does the City have to allow use of its utility poles and the public right-of-way?

California law permits qualified telephone corporations to install wireless communication facilities within the public right of way, although the City can adopt reasonable time, place and manner

regulations for these installations. To minimize neighborhood impacts, the City's policy is to encourage co-location on existing utility poles, rather than installation of new poles.

12. Must the City allow use of City lands (fire stations, community centers, parks, etc.) for wireless telecommunications facilities? What is the process?

    No, the City does not have to provide use of City lands for telecommunications facilities, and may do so on its own terms. City sites, however, are often large enough to accommodate these uses with less visual impact than on other sites. The City may also receive revenue from leasing sites for telecommunications use. There are currently six active leases of City land for wireless telecommunications purposes: two flagpoles on fire station sites, one faux tree on a fire station site, and three ground spaces at the Colorado electric substation site (the antennas are on PG&E antenna towers). The review of such requests is coordinated by the Real Estate Division of the Administrative Services Department. The request is routed to the appropriate departments for review, and is processed by Planning if a use permit or architectural review is required. The lease or license agreement is then provided to Council for its review and approval.

    The Palo Alto Municipal Code prohibits commercial for-profit communications facilities in City parks and open space areas.

13. What can the City require in license agreements for use of City utilities/facilities?

    The City's master license agreement permits cellular carriers and DAS systems service providers to access and use City utility poles, streetlight poles and conduit facilities in the public rights-of-way and public utility easements for the placement of wireless communications facilities. The agreement covers a number of general terms and conditions applicable to the right of service providers to place their facilities in, on and about City-owned and City-controlled facilities, including conditions relating to permit applications, fees and costs, facilities construction, installation, maintenance, repair and relocation, and indemnity, insurance and bonding requirements.

14. What can the City charge for use of City utility poles or City lands?

    The City may charge reasonable rates for the use of City owned utility poles and facilities in the public rights-of-way. While rates may be negotiated, they must be competitively neutral and nondiscriminatory. The City may also charge a permit fee for the placement, installation, repair or upgrading of lines poles or antennae. Under California law, these fees may not exceed the reasonable cost of providing the service for which the fee is charged.

15. If antennas are mounted on City utility poles, can the City require their removal if other utilities are placed underground?

    Upon the formation of an underground utility district, the City can require all above-ground facilities located on utility poles to be relocated underground or elsewhere.

16. What is a "fiber optic" network and how could that support wireless communications and/or reduce the need for cell towers or distributed antenna systems?

    "*Fiber optics*" (optical fibers) are long, thin strands of very pure glass about the diameter of a human hair that carry digital information over long distances.

"Fiber-to-the-home" broadband connections, or FTTH broadband connections, refer to fiber optic cable connections for individual residences. Such optics-based systems can deliver a multitude of digital information -- telephone, video, data, et cetera -- more efficiently than traditional copper coaxial cable. FTTH (also known as Fiber-to-the-Premise FTTP) can be deployed by using either Active Optical Network (AON) or Passive Optical Network (PON) architectures to function.

"Dark fiber" is a term used to describe unlit fiber optic cable that is being leased or is not being used at the time. The amount of dark fiber, particularly in the United States, is very high. Dark fiber is contrasted with active fiber optic cable, often referred to as "lit" fiber. It's "dark" because it's sold without light communications transmission. The user is expected to put his or her own electronics and signals on the fiber and make it light.

Fiber optic cables are usually discussed in relation to the telephone system, the cable TV system or the Internet. One use of a fiber optic network is to provide high speed Internet access to its customers. Fiber optic cables push out data at high transmission rates (e.g., megabits per second "Mbps" or gigabits per second "Gbps") enabling the uses of fiber optic services to surf the Internet or download files at amazingly high speeds. Many of the City's commercial dark fiber customers gain access to the Internet through the Palo Alto Internet Exchange (PAIX, now known as Equinix). PAIX is a carrier-neutral collocation facility that hosts more than 70 Internet Service Providers (ISPs) at its facility in downtown Palo Alto.

The Fiber network, where available, may in some cases be preferable to other wireless communications approaches. Distributed Antenna Systems (DAS) technology employs multiple antennas placed atop utility poles alongside a road or highway to provide coverage to vehicles on the road and to nearby neighborhoods adjacent to the road. DAS technology is used when a carrier seeks to provide coverage to a particular area and there are no feasible locations in the area where a new cellular-tower can be constructed. DAS requires a communication link (fiber connection) to "backhaul" traffic to a wireless carrier's network hub site and this fiber connection could be provided by the City. DAS technology is reliant on having the fiber connection to work effectively. With the introduction of DAS installations, the need for macrocell antenna sites may be reduced for a particular carrier.

Examples of Wireless Macrocell Antennas

Building Mounted

Church Steeple

Faux Tree

MonoPole

Distributed Antenna System (single rod) installation in San Francisco

Simulated Distributed Antenna System/DAS (double antenna) Installation