

City of Cupertino

Wireless Facilities Master Plan



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The cover photograph depicts antennas from five different personal service wireless facilities along State Highway 85 near Interstate Highway 280. In the foreground is a monopole with one set of antennas. There are two sets in the treepole. There is another antenna set in the background next to the lattice tower and the final set is mounted on the lattice tower.

Acknowledgements

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Chapter 1. Introduction

Personal wireless services were first introduced in the region in the early 1980's. The first hand-held equipment or cell phones were very heavy, and service was unreliable and expensive. Consumer demand was small, but continued to grow with continual technological innovation that reduced the size and weight of phones, and improved the reliability and coverage of communications. Increased competition from new companies entering the market have helped drive down prices, making the phones and the cost of service more affordable for the general public.

Rapid consumer acceptance and pervasive use of this communications technology in the last decade have also meant a commensurate proliferation of the personal wireless service facilities throughout this community and the country that is often typified by the rectangular-shaped antennas mounted in clusters on buildings, poles and towers. The rapid proliferation of these facilities presents a unique challenge to Cupertino to protect community aesthetics and promote safety.

Many communities throughout the United States have reacted to this proliferation of personal wireless service facility applications by amending their zoning ordinances to allow such facilities or creating new ordinances to regulate their siting and design. The City of Cupertino took the later approach in 1996 by adopting an ordinance that specifically regulated the siting and design of personal wireless service facilities.

Since then new facility proposals have been reviewed on a case by case basis by the City's Planning Commission with technical expertise provided by the Telecommunications Commission. By 1999, it had become increasingly clear to these City decision makers that the long-term impact on the City's visual landscape through the growing accumulation of these facilities was not being addressed. While the community continues to embrace wireless communications, it will not do so at the cost of the community's appearance. The City Council has endorsed the preparation of a Wireless Facilities Master Plan and has provided funding for a consultant. The City has contracted with the consulting firm of Kreines and Kreines to provide technical expertise on the plan preparation.

This plan, by its nature, must rely on a technical jargon that will not be easily understood by the layperson. Please refer to the glossary in the back of the document for an explanation of the terms.

Chapter 2. Goals

- Protect community aesthetics and promote safety by planning for well-sited and well-designed personal wireless service facilities that fit unobtrusively in the Cupertino environment.
- Guide decision makers and City staff by providing a policy framework and design guidance as they make decisions about these facilities.
- Educate the general public about personal wireless service facilities and the community's design expectations in order to improve their involvement and participation in the decision making process.
- Assist the wireless companies and their representatives with information that facilitates their facility deployment process.

Chapter 3. Summary of Policies

Policy 4-1: Applicants shall use the best available camouflage techniques to reduce the intrusive and obtrusive visual impacts of personal wireless service facilities to the extent possible.

Policy 5-1 : Preferred locations for personal wireless service facilities are on existing buildings and structures.

Policy 5-2 : Only unobtrusive personal wireless service facilities shall be considered in residential neighborhoods.

Policy 5-3 : Development of unobtrusive cell sites in surrounding communities shall be encouraged.

Policy 6-1 : Personal wireless service facilities should be sited to avoid visually intrusive impacts as viewed from the public right-of-way and from residential neighborhoods.

Policy 6-2 : Personal wireless service facilities shall be appropriately scaled to fit harmoniously with the surrounding elements of the site and neighborhood.

Policy 6-3 : Personal wireless service facilities shall be compatible with their surroundings so that their shape, size, color, material, and texture blend with their surroundings.

Policy 6-4: Monopoles with co-located antennas are preferred to single user monopoles if they are less visually obtrusive than separate monopoles.

Policy 7-1 : The City reserves the right to require applicants to prepare radiofrequency radiation assessments for personal wireless service facilities when the general public is in reasonably close proximity to such a facility and to determine compliance with FCC Guidelines.

Policy 7-2 : The City shall require a radiofrequency radiation assessment for the following types of personal wireless service facilities:

- *For building-mounted antennas when the building is designed for human occupancy;*
- *For antennas mounted less than 10 meters (32.8 feet) above ground level;*
- *For all co-located antennas; (The concern is for cumulative emissions exceeding the FCC Guidelines) and*
- *For residential deployment of personal wireless service facilities.*

Policy 7-3: If a network of residential-based personal wireless service facilities is proposed, a comprehensive RFR assessment shall be done for all proposed sites.

Policy 7-4: The City recognizes that it is the responsibility of the carriers to operate its personal wireless service facilities within the adopted federal radio frequency radiation exposure standards over the life of its facilities, regardless of whether the City requires the preparation of a RFR assessment or not.

Policy 7-5: When mechanical ventilation, power generators or other sources of noise are proposed in personal wireless service facilities, the City shall ascertain whether an acoustical analysis is necessary to determine compliance with the City's Noise Ordinance.

Policy 8-1: All personal wireless service facilities approved by the City will be conditioned with a permit expiration date to create opportunities for the City and applicant to check maintenance, check the level of radio frequency radiation emissions, improve equipment and camouflage techniques when needed.

Policy 8-2: All personal wireless service facilities approved by the City shall be conditioned with an abandonment provision providing for dismantling and removal of a facility by the company and/or property owner.

Chapter 4. Background

Federal Regulatory Authority

Master planning for personal wireless service facilities must consider the Telecommunications Act of 1996- a broad revision of the 1934 federal statute governing telecommunications. It is important at the local government level because it contains language that both preserves and limits the authority of local government to regulate personal wireless service facilities.

Section 704(a)(7)(A) states:

Except as provided in this paragraph, nothing in this Act shall limit or affect the authority of a State or local government or instrumentality thereof over decisions regarding the placement, construction, and modification of personal wireless service facilities.

This same section (704) also sets forth the limitations of that local authority:

- Shall not unreasonably discriminate among providers of functionally equivalent services.
- Shall not prohibit or have the effect of prohibiting the provision of personal wireless services.
- Shall act on any request for authorization to place, construct, or modify personal wireless service facilities within a reasonable period of time after the request is filed.
- Shall put any decision to deny personal wireless service facilities into writing, supported by substantial evidence contained in the written record.
- Shall not regulate personal wireless service facilities on the basis of the environmental effects of radio frequency emission to the extent that such facilities comply with the Federal Communications Commission Guidelines for such emissions.

Technology Overview

Wireless communications are transmitted through the air via radio waves of various frequencies. Radiofrequency radiation is one of numerous types of electromagnetic radiation. Cellular and Enhanced Specialized Mobile Radio

(ESMR) operate at frequencies between 800 and 900 megahertz (MHz), and Personal Communications Systems (PCS) operate at the 1900 MHz band.

These three technologies function similarly in that their communications systems consist of interconnected “cell sites” or geographic areas that cover a region. In general, cell sites tend to be smaller in size and more numerous in the cities and larger in size and less numerous in rural areas. This happens because cities have more people (customers) than rural and outlying areas. As more people demand wireless communications services, wireless systems will require additional capacity to handle calls. Capacity is added when wireless companies:

- 1) Change technology from analog to digital,
- 2) Add more cell sites.

Currently, the wireless companies are offering voice communications, paging and text messaging and are aggressively working to improve their offerings of data and video communications and wireless internet services over their wireless networks. To develop the capacity to handle this large amount of information, companies must continue to develop new technologies and undoubtedly provide more cell sites.

Each cell site within the system contains a set of transmitting and receiving antennas that are mounted to the ground, building, monopole or lattice tower. All calls placed with a wireless phone are transmitted by the phone to a cell site antenna that is connected via a land-based line to a central computer switching system. The central switch completes the call by connecting it to a conventional phone through a land-based line or to another wireless phone through the nearest antenna. When a wireless caller or receiver of a call is mobile, the call is handed off from one cell site to another cell site as the user travels through one cell site to another.

Community Issues

1. Height. A determining factor in the location, siting and design of a personal wireless service facility is the height of the antennas. The dish and yagi antennas are used for line of sight transmission, and the panel antennas propagate their radio signals directionally. The height of the antennas is important for line of sight and coverage. Buildings, hills and trees tend to attenuate signal strength when they intervene into the signal path. At some point an attenuated signal becomes so faint it cannot be used. Wireless companies often seek approval for antenna heights that are above the obstructions. Other problems may occur when the coverage area has varying topography, which makes line of sight transmission difficult.

Personal wireless service facility antennas are often mounted on the roof of a building if the building is of adequate height, that is, of at least 25 feet above ground level (two stories). When the building is taller than 25 feet (three stories minimum), the antennas may be side-mounted on the building wall. The challenges occur when most of surrounding structures in a local area are low-profile, one-story buildings and the wireless carrier must erect a new lattice tower or monopole to mount the antennas and achieve the necessary height. Such mounts can have obtrusive visual effects if not properly camouflaged in an area of low-profile buildings.



(Antennas mounted on a lattice tower. Site located at De Anza College near Highway 85.)

2. Facility Proliferation. “How many personal wireless service facilities will be built?” is a frequent question. To some degree the number of facilities will depend on how popular wireless communications will be to the general consumer, how many new companies enter the field, what types of additional services will be offered by these companies, which affects the capacity of the cell sites, and the willingness of the companies to invest in infrastructure.

As more personal wireless service facilities are added to increase capacity, each facility may be shorter in height to serve a smaller area and avoid overlaps in coverage with adjacent cell sites.

A. Consumer Demand – Most companies have already established their initial network of cell sites (the Coverage Phase), which were designed to provide the most coverage per facility and were established along highways and other major transportation corridors. Most of these wireless companies have now entered a Capacity Phase, where companies are infilling their service area with additional facilities to fill “holes” in their coverage and add capacity to high demand areas.

Wireless communications continues to be extremely popular with the general public. The FCC reports that there were 122.4 million wireless subscribers nationwide at the end of 2001, up 54 percent from the end of 1999. In California, wireless phones are even more popular with the total number of subscribers soaring 76% to 15 million in the same time frame. In Cupertino, local high technology companies have sought personal wireless service facility approval on their own buildings in order to improve intra-building and inter-building coverage for their own employees.

B. Number of Companies – There are at least eight wireless companies operating personal wireless service facilities within the City boundaries. There are two cellular companies, one enhanced specialized mobile radio company, four PCS companies, and one paging company. Except for the paging company, which operates one paging facility in the City, and one PCS company, which shares facilities with another carrier, the other companies operate from 3 to 7 facilities within City boundaries.

C. Additional Future Services - Most of the companies envision expanding the range of the services they offer over their wireless networks, going beyond voice communications, paging and text messaging to include transmission of larger quantities of data, video communications and even wireless internet connections. The quantity of information the companies would like to transmit far exceeds the capacity of their existing communications networks. New technologies must be developed, including a much more highly distributed set of personal wireless service facilities to make this vision a reality.

3. Visibility & Aesthetics. Many people find the personal wireless service facilities to be visually unattractive. City staff and wireless companies spend a lot of time designing facilities that are well-camouflaged, but this is becoming a more difficult task as the best sites (least visible) are already occupied with facilities.

Cupertino has outstanding vistas. The primary one is the nearby western foothills, which are largely in a natural state. A City priority is to beautify its major transportation corridors by landscaping its medians and rights-of-way,

requiring significant private landscaping, and relating building design to the public realm. The height and continued proliferation of facilities will likely make them more apparent to residents in the future and potentially create more obtrusive visual impacts than ever before.

One strategy to reduce the proliferation of facilities is to require the co-location of facilities on a single structure, such as, a lattice tower. There is, however, an inherent tradeoff. Accommodating many facilities on a single structure reduces proliferation, but often causes serious visual impacts. Many antennas and equipment concentrated on one lattice tower tend to draw more attention than the dispersal of less visible but more numerous facilities. An example of this is the lattice tower on the De Anza College Campus.

Policy 4-1: Applicants shall use the best available camouflage techniques to reduce the intrusive and obtrusive visual impacts of personal wireless service facilities to the extent possible.

4. Facility Installation in Residential Areas. Personal wireless services are increasingly moving toward home usage. If costs continue to decline, consumers will continue to use their “cell” phone instead of their land line phones while at home. A small, but growing number of subscribers have gone completely wireless, abandoning their land lines. The wireless companies follow their subscribers’ phone usage. Ultimately, the facilities may serve every neighborhood in the City. The deployment of personal wireless service facilities in residential neighborhoods could have significant, obtrusive visual impacts if not properly planned.



It appears in residential neighborhoods, that the best places for personal wireless service facilities will be on top of or attached to light poles, traffic signal poles or other tall structures in the public right-of-way.

(Personal wireless facility on a light pole at Serra Boulevard and Stanford Avenue, Stanford, CA.)



In the past this was done with one company's antennas placed on street lights, which have met with no public objection. The company was a wireless internet service. Even though the company is now out of business, their abandoned antennas continue to dot City streets. Another company has bought the technology and plans on reusing the antenna network.



(Personal wireless facility at Swallow Drive and Lorne Way, Sunnyvale, CA)

Other possible sites for residential deployment include: stadium light poles at high schools, flag poles and light standards in parking lots at churches and other non-residential uses in the neighborhoods.

Chapter 5. Locations & Structures

This section deals with the topic of the best locations and structures in the community for personal wireless service facilities. The continuing demand for personal wireless services throughout the community will escalate the proliferation of facilities, perhaps even into the residential neighborhoods. At risk are the visual qualities of this community: its natural vistas, the tree-lined streets, the well-tended and attractive commercial and industrial areas. The key challenge is to protect community aesthetics and promote safety, while facilitating the use of this technology throughout the community.

It is not the purpose of this plan to encourage the location of every local personal wireless service facility within the City's boundaries. There are numerous nearby locations in the five cities and unincorporated areas that border Cupertino that could serve equally as well or better as potential locations.

The best locations in the community for personal wireless facilities is a function of the land use and the presence or absence of taller structures that can accept antennas that will not be noticed. One of the overall goals is to locate facilities and to site and design them so they are as unobtrusive as possible. In general, non-residential locations are better than residential locations because such facilities are less noticeable and more accepted by the public. Also facilities with antennas mounted on existing structures are generally preferred to facilities with antennas mounted on new structures. Antennas mounted on existing taller structures are usually less noticeable because the structure is already part of the City's visual landscape.

The City's preference order for locations of personal wireless service facilities is:

Most Preferred		Least Preferred	
Existing Structures in Non-Residential Areas	New Structures in Non-Residential Areas	Existing Structures in Residential Areas	New Structures in Residential Areas

Policy 5-1 : Preferred locations for personal wireless service facilities are on existing buildings and structures.

1. Existing Structures in Non-Residential Locations. The following maps and list describe the structures that have been used or may be potentially used for personal wireless service facilities on non-residential lands. It is meant to be as inclusive as possible, but there may be other opportunities that will be reviewed on a case-by-case basis.

A. Privately-Owned Locations (Maps #1 & #3)

There are numerous taller structures on private non-residential property that are candidate locations for personal wireless service facilities. All privately-owned locations are depicted on Map #3, except for personal wireless service monopoles, which are depicted on Map #1. There are two inappropriate structures: 1) billboards-- very large, off-site advertising signs, that are legal, nonconforming structures not permitted to expand their use, and 2) flag poles used for the display of the American and State flags. More appropriate taller structures are described below:

- Taller Buildings: 2+ stories in height
- Parking Lot Light Standards (not mapped)
- Utility Structures: transmission towers, taller utility poles, private water tanks
- P.G.& E. Service Center and Power Substations
- Pylon Signs (not billboards)
- Personal Wireless Service Monopoles
- Religious Institutions
- Historic Structures (e.g. wooden water tower)

B. Publicly-Owned Locations (Map #2)

City-owned Locations

The City of Cupertino owns numerous buildings, structures and properties throughout the community that could be potentially used for personal wireless service facilities. They include:

One and two story buildings that have yet to be built:

- Community Hall
- Library

Existing one story buildings:

- City Hall
- Sports Center
- Quinlan Community Center
- Park & Recreation Centers
- Service Center (Corporation yard has three facilities.)

Relatively undeveloped and vacant properties:

- Remnant properties along Mary Avenue and Highway 85 soundwall
- Parks
- Blackberry Farm Golf Course

Lands, such as lots and public rights of way that have other structures:

- Water tanks
- Traffic Signal Poles
- Electroliers (i.e., street lights)
- Public rights of way (a.k.a. streets)

Other Government-Owned Locations

Other locations owned by other government agencies may be suitable sites for personal wireless service facilities. Each agency would decide whether its properties would be available for lease for personal wireless service facilities. Such facilities need permits from the City since these commercial personal wireless service facilities do not relate directly to the government agency's mission.

- Santa Clara County Fire Department fire stations
- Public School District properties (building mounts, parking lot light standards, stadium light poles)
- De Anza College Campus
- Caltrans Rights-of-Way and Service Center

2. *New Structures in Non-Residential Locations.* There are many non-residential locations that lack a suitable, mounting structure for a personal wireless service facility. And in those instances, carriers, sometimes propose a new lattice tower, monopole or other structure to elevate the antennas. Under these circumstances, the personal wireless service facility should be located in an area that has the least visual impact. In considering such a visible facility, all alternative locations should be reviewed and the best available camouflage techniques should be applied by the carrier to the facility. (See Siting and Design Section of Plan).

Sometimes the most appropriate design solution may be "hiding the facility in plain sight." This is accomplished by camouflaging the personal wireless service facility with materials in colors, sizes, textures and proportions that blend into the environment, without creating visual contradictions. This is discussed in

some detail in the Siting and Design Section. Possible custom-built structures to house or mount personal wireless service facilities include:

- City gateway or neighborhood entry features
- Church steeples
- Building entry features
- Rooftop Chimneys
- Artificial trees (treepoles)
- Artificial Rocks
- Artificial Electroliers
- Artificial Power/Telephone poles

Because there are significant topographic differences in the City, there may be hillside locations in the City where a ground-mounted personal wireless facility will be technically feasible and considered unobtrusive. There are currently no such facilities located in the City.

3. Existing Structures in Residential Locations. One of the largest challenges facing this plan will be providing wireless communications coverage to residential areas. There are large portions of the community that have poor to non-existent coverage because of a lack of personal wireless service facilities in these areas, which are located in the western, southern and eastern portions of the City. These areas are predominantly residential in character and situated at a significant distance from non-residential properties.

The plan assumes that future deployment of personal wireless service facilities in residential areas will occur at low antennas heights. As such, the most unobtrusive mounting structures will likely be existing street lights, traffic signals and utility poles and towers. There will be facility opportunities at high schools, churches and fire stations that are located in residential neighborhoods, but these locations are few in comparison to the number of public utility structures. Techniques to camouflage these facilities are discussed in the Siting and Design section of this plan.

4. New Structures in Residential Locations. Obtrusive personal wireless service facilities that are mounted on new lattice towers or monopoles are inappropriate in residential neighborhoods. Much of Cupertino is developed with one and two-story dwellings and these facilities could stand out in marked visual contrast to their surroundings. If facilities in residential areas are to be considered, the primary goal must be to preserve the visual integrity of the residential neighborhood. Numerous techniques exist to make personal wireless service facilities more compatible and unobtrusive in residential areas. They are discussed in the Siting and Design section.

Policy 5-2 : Only unobtrusive personal wireless service facilities shall be considered in residential neighborhoods.

5. Non-Cupertino Locations. The City of Cupertino is bordered by the cities of Los Altos, Sunnyvale, Santa Clara, San Jose and Saratoga. In the west foothills, Cupertino is surrounded by the unincorporated lands of Santa Clara County. Each jurisdiction has buildings, taller structures and features, and property that could accommodate a personal wireless service facility. In many cases, these locations may be preferable to a Cupertino-based location if they are less obtrusive to the surrounding area. Examples of locations include:

- Shopping centers in all surrounding cities,
- The quarries and lattice towers in the unincorporated west foothills,
- The Hewlett Packard campus, water tank, hotel, office buildings, hospital and lattice towers in Santa Clara along Highway 280,
- Lattice towers, Caltrans right-of-way, water tanks along Highways 85 and 280 in Sunnyvale,
- The Home Depot, office buildings, commercial buildings, high school, and taller utility poles in San Jose,
- The taller utility poles along Prospect Road and hillside locations in Saratoga.

Policy 5-3 : Development of unobtrusive cell sites in surrounding communities shall be encouraged.

Chapter 6. Siting & Design

The previous plan section suggested the interdependence of location, siting and design in determining appropriate places for personal wireless service facilities. Some locations will be validated through siting and design, while other locations, such as a substation, depend less on siting and design policies and guidelines.

Siting is the relationship of the personal wireless service facility to its site and any structures on that site. ***Design*** is the arrangement of parts, details, form, color, etc. to achieve a desired functionality and appearance. Functionality has to do more with the adequacy of the cell site in the wireless company's grid of cell sites. The wireless company is best able to determine the functionality of its cell site. The City is more concerned with the appearance of the facility and how well it fits into the overall context of the built environment. Sometimes the objectives of functionality and appearance will conflict in the process of designing a personal wireless service facility.

Policy 6-1 : Personal wireless service facilities should be sited to avoid visually intrusive impacts as viewed from the public right-of-way and from residential neighborhoods.

Policy 6-2 : Personal wireless service facilities shall be appropriately scaled to fit harmoniously with the surrounding elements of the site and neighborhood.

Policy 6-3 : Personal wireless service facilities shall be compatible with their surroundings so that their shape, size, color, material, and texture blend with their surroundings.

SITING AND DESIGN GUIDELINES

Specific siting and design guidance is provided for personal wireless service facilities categorized by the type of equipment. In general the equipment should be sited to blend in with their surroundings. The environmental context will help dictate the best site and best camouflage technique(s) to use. This is not intended to be an exhaustive survey of siting and design guidance. Wireless companies are encouraged to provide creative solutions to facility siting and design that meet the plan's goals.

1. Antennas

- Antennas near the ground in hilly locations should be screened by existing vegetation. If vegetation is sparse, additional landscaping may be planted that is similar to the surrounding vegetation or native to the area.
- Antennas should be painted and textured to match the background view or foreground view whichever will make the antennas less obtrusive. If the background is the sky, the preference is a flat gray color.
- Antennas may be screened with radio wave transparent materials that have been designed and fabricated to match elements normally viewed in the immediate environment.
- Typically the least obtrusive placement on a building is a flush mounting on some roof-top equipment, structure, penthouse or building wall. A secondary location is a central place on the roof where the roofline can cut off angles of view, making the antennas less visible. The least desirable roof mount is a vertical protrusion at or near the parapet where the antennas are likely to be the most visible.
- For lattice towers, the most successful antennas siting/design solutions are: 1) the top hat design, where a short, rectangular framework of steel is erected on top of the tower and the antennas are mounted to this framework extension, and 2) the leg-mounted design, where the antennas are mounted on the legs of the tower above the ground level.

(Personal wireless service facility using a lattice tower at the extension of California Oak Way and the Union Pacific Railroad tracks.)



- Select antennas of a shape and size that are in proportion to the mounting surface, and mount them flush against the structure.
- On a monopole, antennas should be mounted flush to the shaft or in vertical alignment with the shaft. Some of the newer monopoles have been designed to accommodate more than one set of antennas and their city approvals conditioned with a co-location requirement. The antennas should be enclosed in a screening cylinder if this reduces the obtrusiveness of the facility.
- A new antennas rack configuration on an existing monopole should only be considered if the monopole can be adapted with adequate tree-type camouflage.
- The antenna shape and mounting orientation guideline may be relaxed if the antenna is of such a small size that its presence would not be noticed by the general public. An example of this is the former wireless internet antenna suspended from the cross arm of an electrolier.



(Personal wireless facility at Swallow Drive and Lorne Way, Sunnyvale, CA)

- Antennas may be mounted on top of a pole-type structure (e.g., light pole, traffic signal pole, power/telephone pole, golf course net pole, etc.) if the pole is 30 feet or less in height. The antennas

should be vertically aligned with the pole and shall not exceed 20% of the height of the pole.

2. Co-Located Antennas

Policy 6-4: Monopoles with co-located antennas are preferred to single user monopoles if they are less visually obtrusive than separate monopoles.

- In general co-located antennas mounted on the same monopole, lattice tower or building roof should be less visually obtrusive than separate personal wireless service facilities.
- All of the siting and design guidelines applicable to a single set of antennas apply to co-located antennas as well.
- Building rooftops suitable for numerous co-located antennas should be retro-fitted with larger equipment screens or extensions of the roof element that are architecturally compatible with the building.

3. Cables

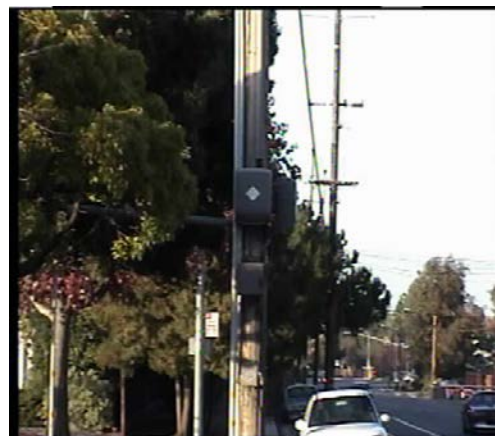
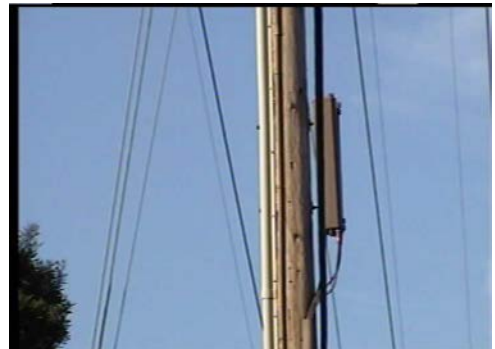
- Cable runs along the ground should generally be undergrounded unless such undergrounding would adversely affect the health of nearby mature trees.
- If the cable runs are located above ground, they should be camouflaged from public view. Cables should not be routed along exterior surfaces unless they are camouflaged with materials that integrate with the design of the structure.
- In lattice towers, cables should be bundled together and routed along the legs or cross members of the lattice tower.



(Depicted are cables enclosed in a conduit that runs along the leg of a lattice tower located above the Monta Vista electrical substation in Cupertino, CA.)

4. Equipment Cabinets & Enclosures

- On developed sites, the best location for equipment cabinets is an interior building space or a pad in an underground parking garage if available. Secondary locations include the roof and ground level parking areas. Roof-mounted equipment should be adequately screened. Ground level equipment enclosures should not remove City-required parking spaces or landscaped areas.
- Ground level enclosures should be tall enough to screen the equipment and match the building materials of other onsite structures whenever possible.
- Screening landscaping should also match existing, onsite landscaping if appropriate.
- For lattice towers, siting the equipment beneath the lattice tower legs is one of the preferred locations.
- For utility pole-type mounts, equipment cabinets may be mounted on the shaft if they are small enough in size to integrate with the appearance of the structure.

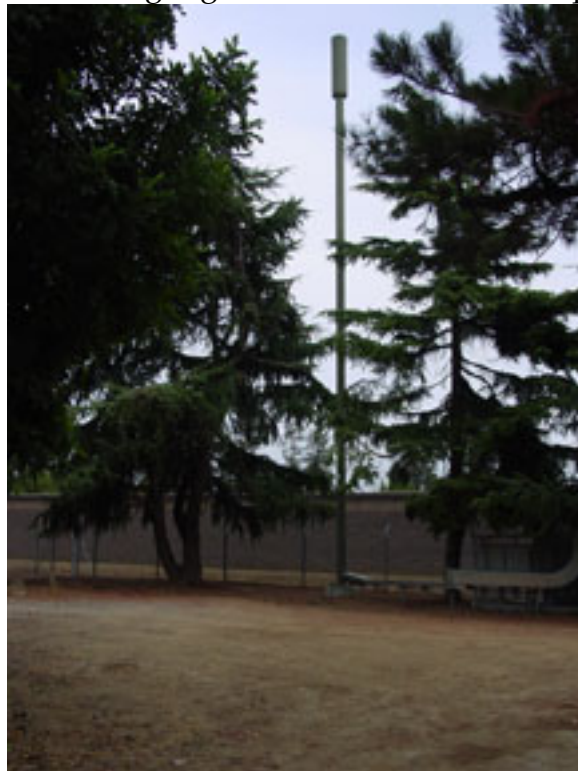


(Personal wireless service facility on a utility pole located on Foothill Blvd. next to Monta Vista Park, Cupertino, CA.)

- Larger equipment cabinets should be sited in underground vaults in the public right of way. The best locations are the street and the sidewalk areas. In general the vaults should avoid landscaped areas and street trees.
- Larger equipment cabinets should also be sited in the rear yards of adjacent residences. Equipment cabinets should not be visible above the fence line. Wireless companies will need to negotiate land leases and easements with affected property owners.

5. Lattice Towers & Monopoles.

- New lattice towers are not allowed by the City because of their obtrusiveness and because monopoles satisfactorily serve the same purpose of elevating the antennas with fewer visual impacts.
- A monopole should be sited among other tall vertical structures or elements to reduce its obtrusiveness, such as, among a cluster of buildings, grove of trees, or within a power substation.



(Slim line monopole among the cedars. Note the cable trays to the right are above ground to better protect the tree roots. Monopole is located near the terminus of Portal Avenue at Highway 280, Cupertino, CA.)

- Monopoles should be approximately the same or smaller diameter as other vertical elements in the surrounding environment. The “slim line” monopoles have dramatically decreased the needed diameter of such poles, but co-location of additional antennas is problematic.

- Monopoles should be colored to match their foreground or background elements. If the sky is the background or foreground element then the monopole should be painted a flat gray color.
- Intrusive and obtrusive monopoles should be camouflaged as artificial trees. Since such artificial trees appear more authentic when placed next to real trees, the planting of larger trees near the monopole may be a project requirement.
- The artificial tree should be of a form similar to the surrounding trees to which it is being visually integrated, and be constructed of materials that retain a natural appearance for the life of the personal wireless service facility.
- The artificial tree should not be significantly taller than the surrounding vertical elements (i.e., buildings, trees, structures, etc.)



(Treepole style antenna mount located on San Tomas Expressway near its intersection with Hamilton Avenue, Campbell, CA.)

Other Structure Mounts.

There is a host of other types of structures that are not buildings, lattice towers or monopoles that may be suitable for elevating antennas and around which a satisfactory personal wireless service facility can be built. This category includes: power/telephone poles, electroliers, taller pylon signs (except billboards), golf course net poles, etc. Some of these structures may not be structurally suitable to carry such wireless facilities, so the City will allow the wireless companies to fabricate suitable replacement structures. In other cases where a structure does not exist, the City may allow wireless companies to design and fabricate a custom-built facility that will fit into its surroundings. Additions or changes to city-owned utility structures will require the review and approval of the City Public Works Department.

6. Replacement Structures

- If the wireless company needs to fabricate a new structure to replace one that is not suitable for antenna mounting, then the new structure shall approximate the size, height, shape, colors and dimensions of the existing structure in order to fit the new structure into the visual landscape. Replacement public structures will need the approval of the City Public Works Department.
- Replacement structures should accommodate internalized cable runs.



(Personal wireless service facility antenna/parking light standard pole in a shopping center off Highway 680, Pleasanton, CA.)

Chapter 7. Health & Safety

Radio Frequency Radiation (RFR)

Background. There is an ongoing debate among scientists and the general public as to the health risks associated with exposure to RFR from personal wireless service facilities. The City of Cupertino has commissioned its wireless facilities master plan technical consultant, Kreines and Kreines, to prepare a paper investigating the federal government's regulation of RFR emissions from personal wireless service facilities and the City of Cupertino's scope of authority to review health and safety issues involving RFR.

This paper, titled: "White Paper: City of Cupertino Scope of Authority to Review Health and Safety Issues Involving Radio Frequency Radiation (including Radiation of Co-located Facilities)" and dated October 31, 2001 is incorporated by reference into this Plan. A copy may be obtained from Cupertino Community Development staff.

The white paper concludes that the City does not have the authority to regulate personal wireless service facilities on the basis of RFR, nor does the City have the authority to set exposure standards for RFR emissions from personal wireless service facilities, which has been pre-empted by the Telecommunications Act of 1996. The Telecommunications Act is very clear that the City may not deny an application for a personal wireless service facility because of RFR if the facility meets the FCC Guidelines for RFR exposure. The prohibition applies only to personal wireless service facilities.

The adopted federal RFR exposure standards are embodied in FCC Guidelines published on August 1, 1996 and titled: "Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation." The FCC-adopted standards are the 1991 Institute of Electronics and Electrical Engineers (IEEE) standards that were subsequently adopted by the American National Standards Institute (ANSI) and became known as ANSI/IEEE C95.1-1992 in combination with a stricter National Council on Radiation Protection and Measurement (NCRP) standard that NCRP set in 1986.

According to the white paper, if the City suspects that RFR standards are being exceeded, it is doubtful that the City has the police powers over a violation of the FCC Guidelines by a personal wireless service facility. An FCC Guide titled: "A Local Government Official's Guide to Transmitting Antenna RF Emission Safety: Rules, Procedures, and Practical Guidance," published in June 2000, suggests that if a violation is suspected, the local government first contact the facility operator, and if it still has questions about compliance, the local government should contact the FCC.

While the City has no authority to regulate or enforce police powers on RFR, it appears the City may review and monitor RFR for compliance with FCC Guidelines. In fact the FCC Guide previously mentioned states:

“... this document recognizes that, as a practical matter, state and local governments have a role to play in ensuring compliance with FCC’s limits, and it provides guidance to assist you in effectively fulfilling that role. The twin goals of this document are: (1) to define and promote locally-adaptable procedures that will provide you, ..., with adequate assurance of compliance, while (2) at the same time, avoiding the imposition of unnecessary burdens on either the local government process or the FCC’s licensees.

Review of RFR Emissions for Compliance with Federal Standards. As a general rule, the applicant should bear the entire cost associated with measuring, recording, reporting and monitoring RFR emissions associated with personal wireless service facilities. Based on previous RFR reports, it is likely that most facilities will not exceed FCC RFR Guidelines; however, the City should establish some standards for assessment to ensure FCC Guidelines are met.

Policy 7-1: The City reserves the right to require applicants to prepare radiofrequency radiation assessments for personal wireless service facilities when the general public is in reasonably close proximity to such a facility and to determine compliance with FCC Guidelines.

Policy 7-2: The City shall require a radiofrequency radiation assessment for the following types of personal wireless service facilities:

- *For building-mounted antennas when the building is designed for human occupancy;*
- *For antennas mounted less than 10 meters (32.8 feet) above ground level;*
- *For all co-located antennas; (The concern is for cumulative emissions exceeding the FCC Guidelines) and*
- *For residential deployment of personal wireless service facilities.*

The RFR reporting must consider potential exposure, as well as, actual exposure. For example, a report that measures ground level RFR exposure of residents in their homes may not take into account the potential of residents adding second stories to their homes and possibly bringing themselves in closer proximity to the transmitting antennas.

Policy 7-3 : If a network of residential-based personal wireless service facilities is proposed, a comprehensive RFR assessment shall be done for all proposed sites.

Policy 7-4 : The City recognizes that it is the responsibility of the carriers to operate its personal wireless service facilities within the adopted federal radio frequency radiation exposure standards over the life of its facilities, regardless of whether the City requires the preparation of a RFR assessment or not.

NOISE

Some of the wireless communication companies require mechanical ventilation to keep their equipment operating within an acceptable temperature range and generators to provide power or backup power in the event of a power outage. All of this equipment are potential noise sources and must comply with the City's Community Noise Ordinance.

Policy 7-5 : When mechanical ventilation, power generators or other sources of noise are proposed in personal wireless service facilities, the City shall ascertain whether an acoustical analysis is necessary to determine compliance with the City's Noise Ordinance.

HAZARDOUS MATERIALS

Hazardous materials that are typically used in personal wireless service facilities may include such materials as Gallium Arsenide (a carcinogen), sulfuric acid in batteries, diesel fuel for generators and compressed gases. The quantities found at these facilities are usually not large and do not present a serious threat to life or property.

All such facilities require building permit review, which includes review by the Fire Department of Santa Clara County that administers the City's hazardous materials ordinance. That ordinance addresses the identification, containment, storage and monitoring of hazardous materials. Fire Department personnel also has specialized equipment, training and personnel to deal with hazardous material releases.

FALLING MATERIALS

Antennas mounted at taller heights and the artificial branches and foliage found on a treepole are subject to strong winds, which may cause breakage and a potential falling material hazard to persons and property at the ground level. The City requires a building permit for all mounted antennas and treepoles. Specific structural analysis for treepoles is also required. At the building permit stage, applicants should be prepared to provide for the artificial tree branches: 1) an analysis of wind resistance factors, testing for material strength and stiffness, and a description of the environmental effects related to solar degradation and fatigue.

Chapter 8. Monitoring

Wireless communications is a high growth industry subject to rapid innovation and technological change. The City should keep abreast of the growth and changes as wireless communications become even more pervasive and integrated into society and our community life. In the future, how the equipment functions, how it looks, and where it is located will probably change and the City must prepare itself to react to change, set standards and plan for the future infrastructure of wireless communication.

Since many personal wireless service facilities have been approved by the City before the preparation of this master plan, many may not meet the City's current guidelines and standards. Periodic review, if legally possible, would benefit the City and the applicant if needed to update the installed equipment. Presently, any modifications to a facility require some type of City approval.

Periodic reviews can be accomplished by placing an expiration date on the City's discretionary approvals. The City permit will then need to be "renewed" after a certain period of time by the applicant, which creates an opportunity for the City and the applicant to check maintenance, make beneficial modifications, not only because of advances in equipment technology, but also advances in camouflaging techniques.

The City has been placing 5-year expiration dates on most facility approvals. Some of these will expire in the next few years. Carriers are responsible for monitoring the expiration dates of their City approvals and applying for time extensions in a timely manner. The City has the right to revoke permits that have expired and terminate the use. Staff should monitor its facility approvals to ensure that future approvals are likewise conditioned and that expirations are "caught" and re-permitted as necessary.

Policy 8-1 : All personal wireless service facilities approved by the City will be conditioned with a permit expiration date to create opportunities for the City and applicant to check maintenance, check the level of radio frequency radiation emissions, improve equipment and camouflage techniques when needed.

In the event a company abandons its personal wireless service facility, the facility should be dismantled and removed by the company and/or property owner. Such a condition should be placed in City approvals for private property and in City lease agreements for City-owned and leased properties.

Policy 8-2 : All personal wireless service facilities approved by the City shall be conditioned with an abandonment provision providing for dismantling and removal of a facility by the company and/or property owner.

Chapter 9. Implementation

BACKGROUND

This section of the plan addresses how this wireless facilities master plan will be implemented by the City through its zoning ordinances, City lease agreements and development standards. While all personal wireless service facilities will require some sort of discretionary review and/or approval, the City will not be overly burdensome from a regulation standpoint for well-designed and sited facilities that meet the goals of this plan. Applicants can expect a “tiered permit system” where the level of staff and public review of a facility proposal will depend on how well a facility is camouflaged and how unobtrusive it is in appearance to the viewing public. The necessity for a RFR report is a separate issue. The RFR report’s conclusions may affect the level of review. The Planning Division staff is the main contact for most City approvals of personal wireless service facilities.

Facility Development Permits

Simple		Complex	
Building Permit Only (Staff)	Director’s Approval	ASA/Design Approval	Use Permit (Planning Commission)

1. Building Permit Only.

Only a building permit is required for personal wireless service facilities that are totally screened from any public view. The facility is able to use existing structures to screen the equipment, or replace existing structures with ones composed of radio transparent materials that are identical in appearance. While Planning staff reviews these proposals for qualification, no separate planning permit is required. To date, very few facilities have qualified for this minimum level of review.

2. Director’s Approval.

Also known as a Director’s Minor Modification, this approval is executed by Planning staff and the Community Development Director. No public hearing or notice is required, but the decision is reviewed and may be appealed by anyone during a 14 calendar-day appeal period. Typically, well-screened, building-mounted or structured-mounted personal wireless facilities qualify for this level of planning approval. A separate building permit is also required.

3. ASA/Design Approval.

Certain personal wireless service facility projects require design approval by the Design Review Committee, a two-member subcommittee of the Planning Commission. The public meeting is less formal than a full Planning Commission hearing and requires 10-day advanced noticing of adjacent property owners. This type of planning application is required for more noticeable building and structure-mounted personal wireless service facilities. Plans are reviewed by a member of the Telecommunications Commission. A separate building permit is also required.

4. Use Permit.

Typically, new tower- or monopole-mount personal wireless service facilities will require public review by the City's Planning Commission. Public hearing noticing consists of a notice published in a local newspaper of general circulation and mailed noticed to property owners within 500 feet. Plans are reviewed by a member of the Telecommunications Commission. A separate and sequential building permit is also required.

The Community Development Director may refer a Director's Minor Modification to the Planning Commission for public hearing review. This is necessary when the Director believes there are significant design issues or potential public controversy about the project. Noticing may be just adjacent property owners or more if warranted by the Director.

WIRELESS COMMUNICATIONS FACILITIES ORDINANCE

The wireless communications facilities ordinance was adopted and incorporated into the City's Municipal Code (Chapter 19.108) in 1997. It has been the City's main implementation tool and by default its policy document for the review of all personal wireless service facilities in the City. With the adoption of a wireless facilities master plan, this ordinance will need to be updated and broaden to implement the master plan. The ordinance shall specify maximum antenna height and provide for an exception process. This ordinance also regulates ham radio facilities intended for personal use. *Implementor: Community Development Dept.*

OTHER ZONING ORDINANCES.

The Location Section of this Plan identifies all types of locations and structures that may be appropriate for personal wireless service facilities. Since these locations and structures may be in any number of zoning districts, a review and probable amendments of the zoning code is required to ensure that it is

internally consistent with the Wireless Facilities Master Plan. *Implementor: Community Development Dept.*

OTHER CITY ORDINANCES AND CITY POLICIES

As this master plan proposes the potential lease of all types of City property for private purposes, a review of other City ordinances and policies regarding such lease to private concerns is necessary to ensure that they are internally consistent with the Wireless Facilities Master Plan and that appropriate levels of review are built into the leasing process. *Implementors: Community Development Dept., Public Works Dept. & City Attorney*

LEASE AGREEMENTS

A lease to locate personal wireless service facilities on an existing City-owned facility or structure is typically negotiated with Public Works Department staff and approved or disapproved by the City Council at a public hearing. The level of Planning Division involvement and public review depends on the obtrusiveness of the facility. A building permit may also be required. An example of this type of entitlement is the lease of City light standards to a wireless company for its antenna boxes. Leases involving the construction of new stand-alone facilities will probably require greater scrutiny. Model lease agreements should be developed by the City to facilitate lease of public property and structures for personal wireless service facilities and to protect City interests. Coordination with affected departments, such as the Parks and Recreation Dept. for City parklands, will be necessary to ensure their concerns are met. The City's consultant has prepared a survey of lease rates to ascertain market rental rates for such facilities. *Implementor: Public Works Dept.*

CITY STANDARD DETAILS

The City Public Works Department maintains standard specifications for all public works structures. Some of the structures suggested in this plan, like traffic signal poles and light poles, may not be physically or structurally suited to accommodate a personal wireless service facility. These structures should be evaluated by the wireless companies and the Public Works Department to determine their suitability. An alternative design or standard may need to be adopted to accommodate a residential deployment of personal service wireless facilities. *Implementors: Public Works Dept. & Wireless Companies.*

Chapter 10. Glossary of Terms

A meaningful understanding of this Wireless Facilities Master Plan depends on a common knowledge and understanding of the terminology used in this document. The Plan uses the following terms and their definitions in regulating and planning personal wireless service facilities.

- **Above Ground Level (AGL).** A measurement of height from the natural grade of a site to the highest point of a structure.
- **Antenna.** An antenna is the transmitting/receiving portion of the personal wireless service facility that tends to be, proportionally, a small part of the total personal wireless service facility. Presently, five (5) types of antenna have been identified:
 - Dish or Parabolic Antenna. This is a bowl-shaped antenna of varying diameter used for point-to-point microwave communications.
 - Global Positioning System (GPS) Antenna. This is a small can-shaped antenna affix to a rod and mounted at a lower height, usually near the equipment cabinets.



- Panel Antenna. This is an antenna usually deployed in clusters of three and commonly used in cellular and PCS systems. These antennas usually are rectangular in shape, standing with the end up. They can resemble plastic or glass light casings, such as seen on streetlights, but the more typical shape is like a fluorescent light case.

They are typically 4-5 feet in height, 6-12 inches in width and 6-8 inches in depth.

- Whip Antenna. This is an omni-directional antenna that appears as a very thin, rod-like element, projecting up or down from its mount. They are typically 2-6 inches in diameter and 1-18 feet in length.
- Yagi Antenna. This is a directional antenna designed to “see” one site. It consists of a thin, rod-like element with half a dozen or more short cross members mounted at right angles. This antenna is mounted in a horizontal direction from its mount.
- **Antenna Mount or Mount.** This term refers to the antenna mounting hardware and the structure, if any, that elevates the antennas above the surrounding landscape, for example, a building, monopole, lattice tower, etc. There are four (4) typical types of mounts:
 - Ground-mount. Each antenna is fastened to a separate, short, thin rod that is anchored to the ground. These installations would be typically seen on foothill properties where the height of the hill provides the elevation for the antennas.
 - Roof-mount. Antennas are mounted on the roof of a building.



- Side-mount. Antennas are mounted on the side of a building.

- Tower or Monopole-mount. Antennas are mounted on the top or side of a lattice tower, guyed tower or monopole, or a monopole. Sometimes a large and substantial framework is added so the antennas will protrude noticeably above or beyond the surface of the tower or monopole. This is referred to as a “top hat” or “rack” configuration, which is often used to accommodate more than three panel antennas at one mount. On monopoles, sometimes a dual-polarized or cross-polarized panel antennas are used which allows the antennas to be mounted very closely, almost flush, to the surface of the monopole.
 - Structure-mount. Antennas are mounted to the top or side of a structure, other than a building, tower or monopole, such as a water tank or tall ground sign.
- **Applicant.** A person or entity who submits a permit application for a personal wireless service facility before the City of Cupertino.
 - **Base Transceiver Station.** The personal wireless service facility equipment housed in cabinets or an enclosure or shelter. The term is usually used for a PCS-type cell site.
 - **Camouflage.** A palette of techniques used to disguise, hide and conceal a personal wireless service facility from public view by blending its appearance into elements of the visual background. The term connotes the use of paint, landscaping, building materials and artificial screens in patterns that merge with the elements in the background environment.
 - **Carrier.** An entity or company in the business of providing personal wireless services.
 - **Cell Site.** An informal term for a personal wireless service facility.
 - **Cellular.** A mobile telephone technology operating in the 800 MHz range of the electromagnetic spectrum.
 - **Co-applicant.** All other persons and/or entities joining with an applicant in permit application for a personal wireless service facility, including the owner(s) of the personal wireless service facility, the property owner(s), and any tenant(s) for the personal wireless service facility.
 - **Co-location.** The practice of installing antennas from more than one wireless communications company on a single antenna mount.
 - **Co-location, Horizontal.** The horizontal orientation of personal wireless service facilities from more than one carrier on a building.
 - **Co-location, Vertical.** The generally vertical orientation of personal wireless service facilities from more than one carrier on a vertical mount such as a monopole or lattice tower.

Horizontal Co-location of Antennas



- **Commercial Mobile Radio Services (CMRS).** As defined by Section 704 of the 1996 Telecommunications Act, any of several technologies using radio signals at various frequencies to send and receive voice, video and data. These are considered “functionally equivalent services” by the Telecommunications Act.
- **Cross-polarized Antenna.** Three panel antennas flush-mounted or attached very close to a shaft.
- **Design.** The appearance of a personal wireless service facility, which includes materials, colors and shape.
- **Enhanced Specialized Mobile Radio (ESMR).** Private land mobile radio with telephone services. The local purveyor of this communications technology is Nextel Communications.
- **Environmental Assessment.** The document required by the Federal Communications Commission and the National Environmental Policy Act when a personal wireless service facility is proposed in an area that may be environmentally affected by the facility. The environmental assessment must show how negative environmental impacts can be mitigated.
- **Equipment Cabinets.** Personal wireless service facilities also include one (1) or more small, enclosed structures, cabinets, boxes, sheds or underground vaults near the base of the antenna mount. These structures house power connections, emergency batteries, hardwire telephone connections and sometimes ventilation equipment needed for the operation of the facility. The equipment is connected to the antennas by cable(s). The equipment is usually secured by an enclosing structure, such

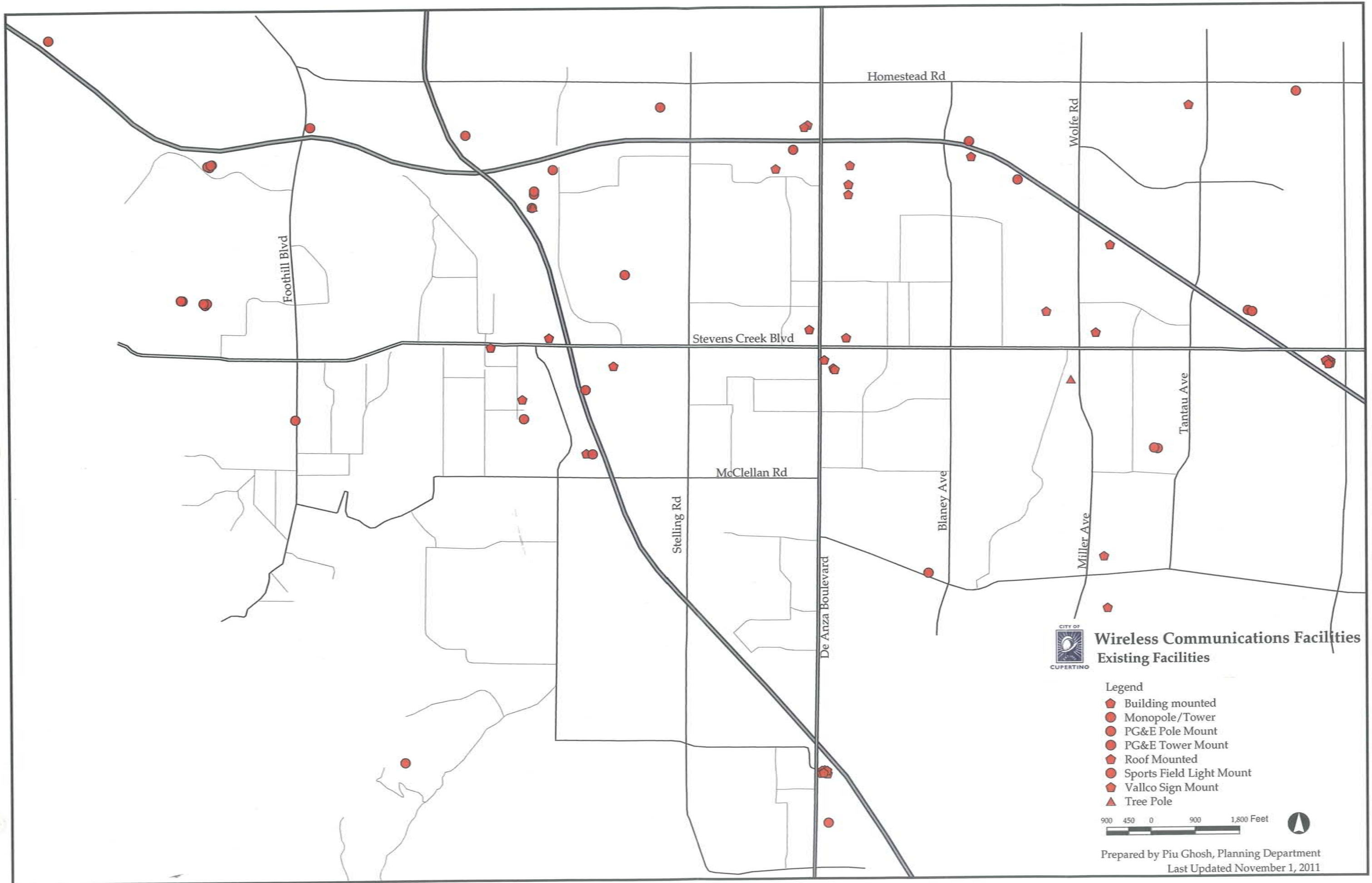
as a fence, shed or vault. "Base transceiver station" is also used to describe the radio equipment in these structures used by PCS technology.

- **Facility.** See Personal Wireless Service Facility.
- **Federal Communications Commission (FCC).** The FCC is the United States governmental agency responsible for regulating personal wireless services. This agency issues licenses and writes federal regulations and standards governing telecommunication companies. The Telecommunications Act of 1996 granted this agency significant authority to regulate personal wireless services.
- **Functionally Equivalent Services.** Cellular, PCS, ESMR, Specialized Mobile Radio and Paging. According to the Telecommunications Act, these five services must receive the same treatment by local government.
- **Guyed Monopole or Guyed Tower.** A monopole or lattice tower that is anchored to the ground or other surface by diagonally-oriented cables.
- **Intrusive.** A term used to describe a personal wireless service facility that visually contrasts with its surroundings to the point of conflicting with it, but not to the extent of visually dominating the surroundings (See Obtrusive.)
- **Lattice Tower.** A self-supporting mount with multiple legs and cross bracing of structural steel.
- **Licensed Carrier.** A company authorized by the FCC to construct and operate a commercial mobile radio services system.
- **Location.** The area where a personal wireless service facility is located or proposed to be located. The term differs from "siting".
- **Mean Sea Level (MSL).** A uniform reference point from which height can be measured.
- **Modification.** The changing of any portion of a personal wireless service facility from what was approved in a previous City permit.
- **Monopole.** A self-supporting mount consisting of a single shaft of wood, steel or concrete specifically designed and constructed to carry more than one personal wireless service antenna.
- **Mount.** See Antenna-Mount.
- **Obtrusive.** A term used to describe a personal wireless service facility that is visually dominating to its surrounding environment. This term usually applies to a facility where a new monopole or lattice tower is erected to mount the antennas. It may also apply to building-mounted or structure-mounted facilities that lack adequate camouflage.
- **Omni-directional Antenna.** A thin rod that transmits or receives a radio signal in all directions. Also called a "whip" antenna.
- **Paging.** A service that provides tone, text and limited voice messaging. Commercial paging operates on several frequencies, including narrowband PCS.

- **Panel Antenna.** A flat surface antenna that is usually deployed in three directional sectors and used to transmit and receive signals from that sector only.
- **Personal Communications Services (PCS).** A form of radiotelephone service capable of transmitting and receiving voice, data, text and video messaging and which operates in the 1850-1900 MHz range.
- **Personal Wireless Services.** The Plan uses the definition found in Section 704 of the Telecommunications Act of 1996. Unlicensed Wireless Services, Common Carrier Wireless Exchange and Commercial Mobile Radio Services, which includes: Cellular, Personal Communications Services (PCS), Enhanced Specialized Mobile Radio, Specialized Mobile Radio and Paging.
- **Personal Wireless Service Facility.** As defined in the Telecommunications Act of 1996, a facility that is designed to provide personal wireless services.
- **Pylon Sign.** A sign erected on a tall and substantial supporting structure, but is not a billboard sign.
- **Radio Frequency (RF) Engineer.** Someone with a background in electrical engineering who specializes in the study of radio frequencies. RF engineers are licensed by the State as Professional Engineers.
- **Radio Frequency Radiation (RFR).** The emissions from personal wireless service facilities that in excessive amounts can be harmful to humans.
- **Search Ring.** A generally circular geographic area of a specific radius that a carrier uses to focus his search for a personal wireless service facility location.
- **Separation.** The distance between one carrier's antenna array and another carrier's antenna array. Separation may be horizontal or vertical.
- **Siting.** The method of placing a personal wireless service facility on a specific site or property. The term differs from determining "location."
- **Specialized Mobile Radio (SMR).** A group of services serving dispatch and data communication users, usually over a small geographic area. SMR operates over several frequencies in the 800 to 900 MHz range.
- **Telecommunications Act of 1996.** This is a broad revision of the 1934 federal statute governing telecommunications. It is important at the local government level because it contains language that both preserves and limits the authority of local government to regulate personal wireless service facilities.
- **Unobtrusive.** A term used to describe a personal wireless service facility that is not visually dominating to its surroundings. These are usually facilities mounted on buildings or other structures that are well-camouflaged. This also describes facilities that are not as well camouflaged, but do not visually stand-out because of placement, shape

and/or relative size of the facility compared to surrounding visual elements.

- **Unlicensed Wireless Services.** Commercial mobile services that can operate on public domain frequencies and that therefore need no FCC license for each personal wireless service facility. However, an unlicensed carrier needs a FCC license. Examples are Metricom and Wi-Fi.



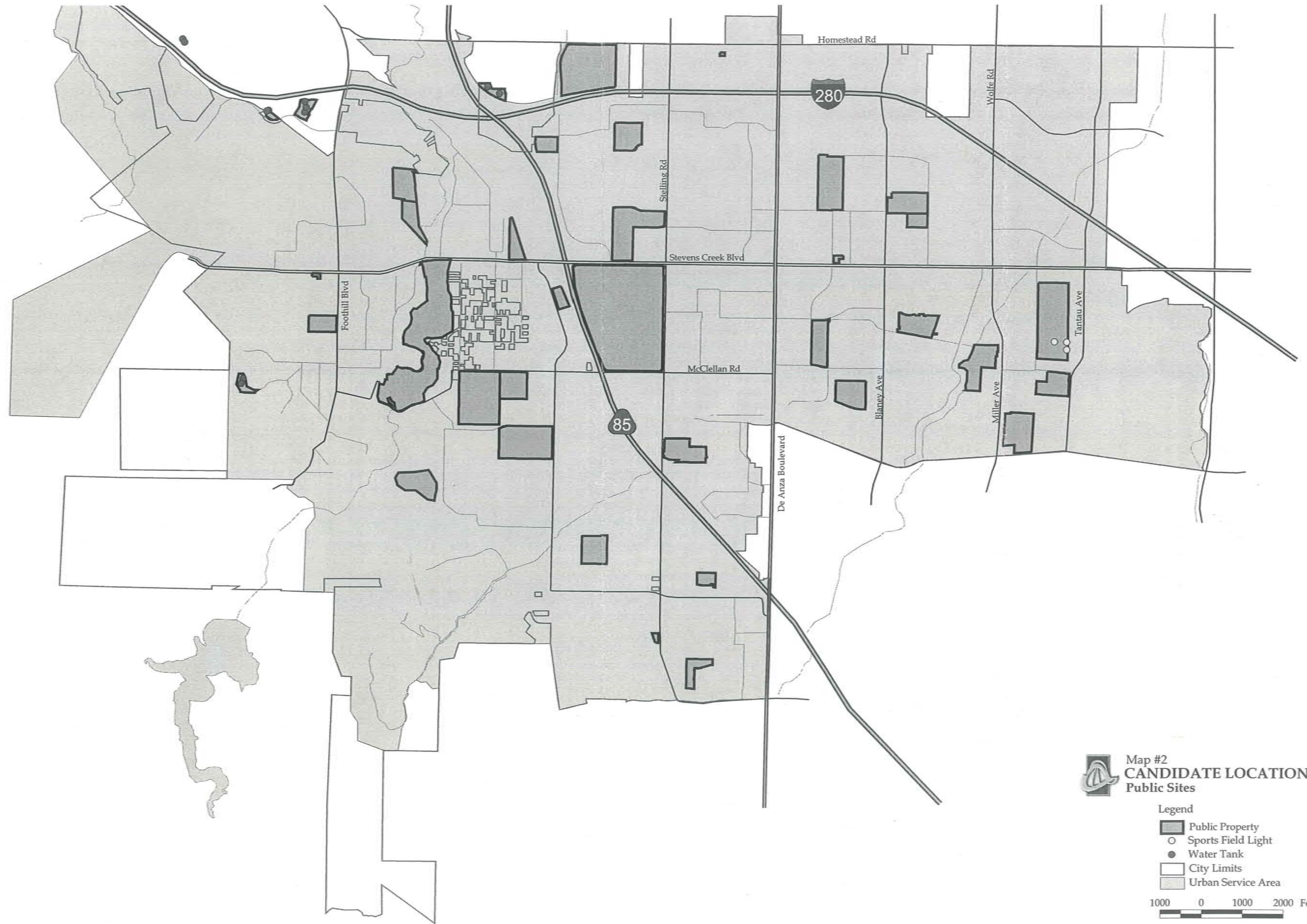
**Wireless Communications Facilities
Existing Facilities**

Legend






-  Building mounted
-  Monopole/Tower
-  PG&E Pole Mount
-  PG&E Tower Mount
-  Roof Mounted
-  Sports Field Light Mount
-  Vallco Sign Mount
-  Tree Pole

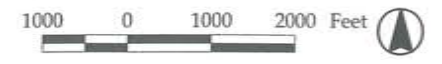


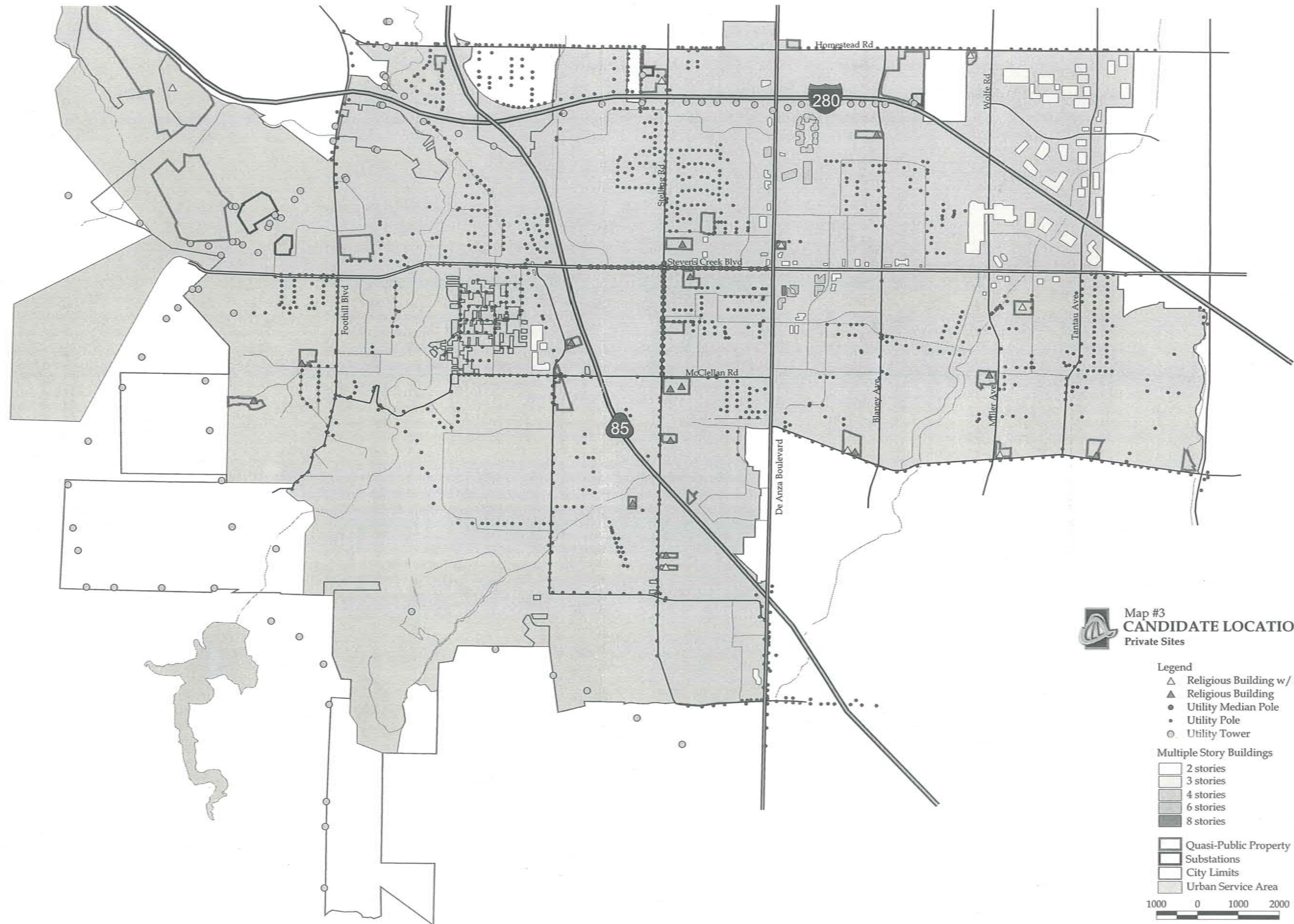
Prepared by Piu Ghosh, Planning Department
Last Updated November 1, 2011



Map #2
CANDIDATE LOCATIONS
 Public Sites

- Legend
-  Public Property
 -  Sports Field Light
 -  Water Tank
 -  City Limits
 -  Urban Service Area





Map #3
CANDIDATE LOCATIONS
 Private Sites

- Legend
- △ Religious Building w/ steeple
 - ▲ Religious Building
 - Utility Median Pole
 - Utility Pole
 - Utility Tower

- Multiple Story Buildings
- 2 stories
 - 3 stories
 - 4 stories
 - 6 stories
 - 8 stories

- Quasi-Public Property
- Substations
- City Limits
- Urban Service Area

