Considerations for Emergency Communication Antennas Zoning and Permitting

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Disclaimer: Not being an attorney, much less an "antenna attorney," these suggestions cannot be construed as legal advice or authoritative legal interpretation. Rather, they are an attempt to bring context to the needs and requests of the Emergency Management for effective back-up radio antenna equipment in light of the community desires to avoid unnecessary eyesores.

Location of New Emergency Operations Center

The new location for the Alachua County Emergency Operation Center, 1125 NE 8th Avenue, appears to be in a zoning district denoted by: 0103MU1[1] Thus, it is a "mixed use," not "residential" zoning district.

Backup radio systems utilizing Amateur Radio Service as well as Federal & State Systems

For many years, Alachua County Emergency Management has included volunteers who exercise and utilize both FCC Amateur Radio Service communications, as well as other radio service communications licensed separately under State or Federal auspices. All of these systems are designed to provide communications when normal wired Internet, cell phones, and telephones fail. All of these require antennas, and the engineering aspects of these antennas are all driven by the same laws of physics, differing only in the practical aspects of physical construction differences as the frequency and wavelength change. The systems utilize span the range of frequencies from 2MHz to beyond 2 GHz, and the wavelengths from 160 meters to centimeters. As a result, some of the antenna types are built using long, thin wires (and are nearly invisible) while others depend on specially configured aluminum rods etc.,, in the familiar shape of home TV antennas or CB radio vertical antennas. This is all driven by the laws of Physics.

The Federal Communications Commission specifically encourages the services of all volunteers in the Amateur Radio Service to benefit their local communities[2] and an extremely large number of communities partake of this voluntary service. The largest national amateur radio organization formed a service, "The Amateur Radio Emergency Service" more than half a century ago to provide volunteer training and guidance, and local volunteers are heavily involved in this.

1 Based on reviewing Gainesville ARCGISHub City of Gainesville Zoning, https://hub.arcgis.com/datasets/acgm::city-of-gainesville-zoning/explore?location=29.660247%2C-82.313614%2C16.00

2 See for example, extensive encouragement in https://www.federalregister.gov/documents/2010/08/04/2010-19198/amendment-of-the-commissions-rules-regarding-amateur-radio-service-communications-during-government

City of Gainesville Zoning Ordinances Relating To Antennas

The City of Gainesville appears to have two major sections in zoning and permitting ordinances that bear on radio communications antennas, two paragraphs within Sec 30-5.33 (Wireless communications facilities and antenna regulations).[3]

Sec 30-5.33: Wireless communications facilities and antenna regulations

A.	Purpose	
B	Applicability and general requirements	Basically declares all property is subject.
C	Collocation	Does not appear to apply to our effort, as there are no significant pre-existing antenna structures or tower.
D	Modification of existing tower	There is no existing tower at the location
E	Camouflaged towers	Appears to relate to cell phone towers
F	Monopole towers	Relates to towers made out of a single pole.
G	Personal wireless service	As will be discussed, the definitions appear to indicate this applies to cell phone systems, not our type systems
H	Amateur radio towers	Written for residential zoning districts, presumably more restrictive than mixed-used districts, and still allows towers as much as 80 feet from ground level.
I	Historic preservation/conservation district	The new site is not within any historic preservation district
J	Broadcast towers, re transmission and microwave transmission towers	Not applicable
K	Unused for abandoned towers	Not applicable
L	Submittal Requirements	Appears to relate only to TOWERS
M	Television antennas	Not applicable
N.	Environmental regulations	"shall comply with all applicable environmental regulations"
O	Signs and illumination	Limitations on signs (not applicable)
P	Technical consultants	Relates to evaluation of "individual commercial wireless facility applications" - not applicable to us.

The only obviously applicable (to any extent) portions include the Purpose, the Amateur Radio paragraph (which only addresses residential districts), and environmental concerns.

3 https://library.municode.com/fl/gainesville/codes/code_of_ordinances?nodeId=PTIICOOR_CH30LADECO_ARTVUSST_DIV1PRUS_S30-5.33WICOFAANRE

Section 30-5.33 presents its **purpose** as the following: [emphases added for clarity]

> A. Purpose. These regulations were developed **to protect the health, safety and welfare of residents of the city, and to protect property values and minimize visual impact** while **furthering the development of enhanced telecommunications services in the city**. These standards are designed to comply with the Telecommunications Act of 1996 and the requirements of F.S. Ch. 365. The provisions of this section are not intended to and shall not be interpreted to prohibit or have the effect of prohibiting the provision of personal wireless services. This section shall not be applied in such a manner as to unreasonably discriminate between providers of functionally equivalent services, consistent with federal regulations.
>
> These regulations are intended to:
>
> 1.**Provide uniform standards** for the provision of both radio and television broadcast signals and telecommunication services, **including two-way radio**, paging, personal communication services (PCS), cellular and related wireless services;
>
> 2.**Protect the natural features and aesthetic character of the city** by regulating the location, design and operation of wireless communication facilities, with special attention to residential neighborhoods, public parks, transportation view corridors, historic districts, historic landmarks, and environmentally sensitive lands;
>
> 3.**Minimize the adverse visual and aesthetic impacts of wireless communication facilities** through innovative design, siting and landscaping standards, including incentives to promote the use of camouflaged towers, collocation of new antennas on existing communication towers and the placement of antennas on roofs, walls, existing towers and other existing structures;
>
> 4.Accommodate the growing demand for wireless communication services, consistent with the Federal Telecommunications Act of 1996, and ensure an efficient and high-quality wireless communications network; and
>
> 5.Expedite the review process for those new applicants choosing the least intrusive alternative of deploying wireless telecommunication services.

The Ordinance includes a statement that it is in compliance with 101 FCC 2d 952 (1985), or with 47 CFR §97.15(b),

This language for "purpose" makes sense and of course all of us would like to continue to have a beautiful city and county. However, as we compare the

- needs for emergency radio communication (for which numerous enormous towers have been already permitted and constructed) and
- quite insignificant impacts of the proposed antennas, and
- potentially overriding instructions from Federal Regulations,

with the wording of the existing ordinances (which in many sentences, simply don't apply to the types of radio systems we need), I believe it will be reasonable to provide suitable radio antennas at the new EOC location as were present in the existing EOC.

First, amateur radio is a **licensed Radio Service** explicitly provided for by federal regulations, for several important purposes which are delineated in CFR 47 Part 97.1[4] [emphasis added to note applicability]

> § 97.1 Basis and purpose.
> The rules and regulations in this part are designed to provide an amateur radio service having a fundamental purpose as expressed in the following principles:
>
> (a) **Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications**.
>
> (b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.
>
> (c) Encouragement and improvement of the amateur service through rules which provide for advancing skills in both the communication and technical phases of the art.
>
> (d) Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.
>
> (e) Continuation and extension of the amateur's unique ability to enhance international goodwill

As a result of this special importance to the Nation of volunteer communicators, the Federal Communications Commission has also promulgated regulations to protect the ability of amateur radio

> § 97.15 Station antenna structures.
> (a) ....
>
> (b) Except as otherwise provided herein, a station antenna structure **may be erected at heights and dimensions sufficient to accommodate amateur service communications**. (**State and local regulation of a station antenna structure must not preclude amateur service communications. Rather, it must reasonably accommodate such communications and must constitute the minimum practicable regulation to accomplish the state or local authority's legitimate purpose.** See PRB–1, 101 FCC 2d 952 (1985) for details.)operators to have workable antenna systems.[5]

4 https://www.law.cornell.edu/cfr/text/47/97.1
5 https://www.law.cornell.edu/cfr/text/47/97.15

It appears that this Federal regulation may supersede to the degree specified, state and local regulation of Part 97 licensed radio stations. (Our operation at the EOC is a Part 97 licensed operation under the club callsign of NF4AC, as well as under Department of Homeland Security additional licensure secured by the county.)

An attorney experienced in "antenna law" has broken the impact of this Federal Regulation down into simple segments:[6]

- Local ordinances must be crafted to reasonably accommodate amateur communications.[7]
- Local ordinances must be the minimum practical regulation to accomplish the authority's legitimate purpose.
- Local ordinances must permit "heights and dimensions" sufficient to accommodate amateur service communications.

Paragraph (H) cited above appears to be written with sufficient heights, dimensions, and limited regulation to allow for workable antenna systems. Our requests are far more modest than those envisioned by Paragraph (H), and our requests not only encompass provision for Amateur Service emergency communications, but also the legitimate needs for emergency communications from the county to neighboring counties and to and from the State of Florida by systems which have been specifically designated by the State for those purposes.[8] However, Paragraph (H) applies only within residential districts; there are no obvious explicit limitations on amateur radio service towers (other than FAA limitations) in multi-use districts.

Florida Statutes 166.0435 creates the requirement to make reasonable accommodation:

> No municipality shall enact or enforce any ordinance or regulation which fails to conform to the limited preemption entitled “Amateur Radio Preemption, 101 FCC 2d 952 (1985)” as issued by the Federal Communications Commission. Any ordinance or regulation adopted by a municipality with respect to amateur radio antennas shall conform to the above cited limited preemption, which states that local regulations which involve placement, screening, or height of antennas based on health, safety, or aesthetic considerations must be crafted to reasonably accommodate amateur communications, and to represent the minimum practicable regulation to accomplish the local authority’s legitimate purpose.

Florida Statutes 125.561 repeats this requirement.

How Our Proposed Antenna Systems Comply with Federal and Local Regulation

First, it is patently obvious by mere observation of the map of Historical Districts, that the proposed EOC location is not within any Historical District.

6 See: https://www.antennazoning.com/attachments/PRB1_Article.pdf

7 The City of Gainesville Section 30-5.33 (b) appears to potentially be written in light of this Federal Requirement, in that it allows for tower structures -- even in residential neighborhoods -- of up to 80 feet! The engineering-based requests that we propose are far less intrusive than those allowed by that section.

8 Specifically: the Statewide Law Enforcement Radio System (SLERS), the DHS SHARES ALE (automatic link establishment) system, and the DHS SHARES WINLINK (radio email) system.

The word "antenna" can be confusing, and its usage within Gainesville Ordinances must be carefully considered. CFR 47 95.303 provides the federal legal definition of an antenna:

> Antenna. A device that converts radio frequency electrical energy from a transmitter to radiated electromagnetic energy[9]
>
> Gainesville ordinances have a similar definition:
> *Antenna* means any exterior apparatus designed for sending and/or receiving intelligence without physical connection [10]
>
> Gainesville ordinances include a definition for "transmitter tower" but it specifically excludes structures created and/or used by public utilities and governmental agencies:
>
> Transmitter tower means a structure designed, constructed or used for the purpose of supporting an antenna used for transmitting and/or receiving any form of radio, television, radar or other type of wave, impulse or other electromagnetic signal. Antennas mounted on poles that are less than three inches in diameter and are no more than 20 feet above the highest point of the roof are secondary towers and shall not be considered transmitter towers. **This definition also does not include structures supporting antennas constructed and/or used by public utilities and governmental agencies. [emphasis added]**[11]

To many people, an "antenna" may be one of the following:

- A large rectangular structure high on a tower that beams cellular telephone signals to a quadrant of its surroundings.
- An oblong or circular concave dish that focuses satellite energy for reception.
- A tall metal tower that is somehow involved in radio transmission

However, the Federal definition is "operational" rather than relying on a visible image. The types of "antennas" that our amateur radio operation, and state/federal training and emergency communications require, fall into three basic types:

1. A long thin wire, generally high above the surface of the earth, stretched between vegetative supports or potentially from a mechanical support such as a metal tower or building surface. The wire is typically so thin that it is difficult to even pick out in the scenery unless the observer is close and very perceptive. (Used for "shortwave" or "high frequency" (HF) communications to surrounding counties or the State of Florida without the need for the Internet.

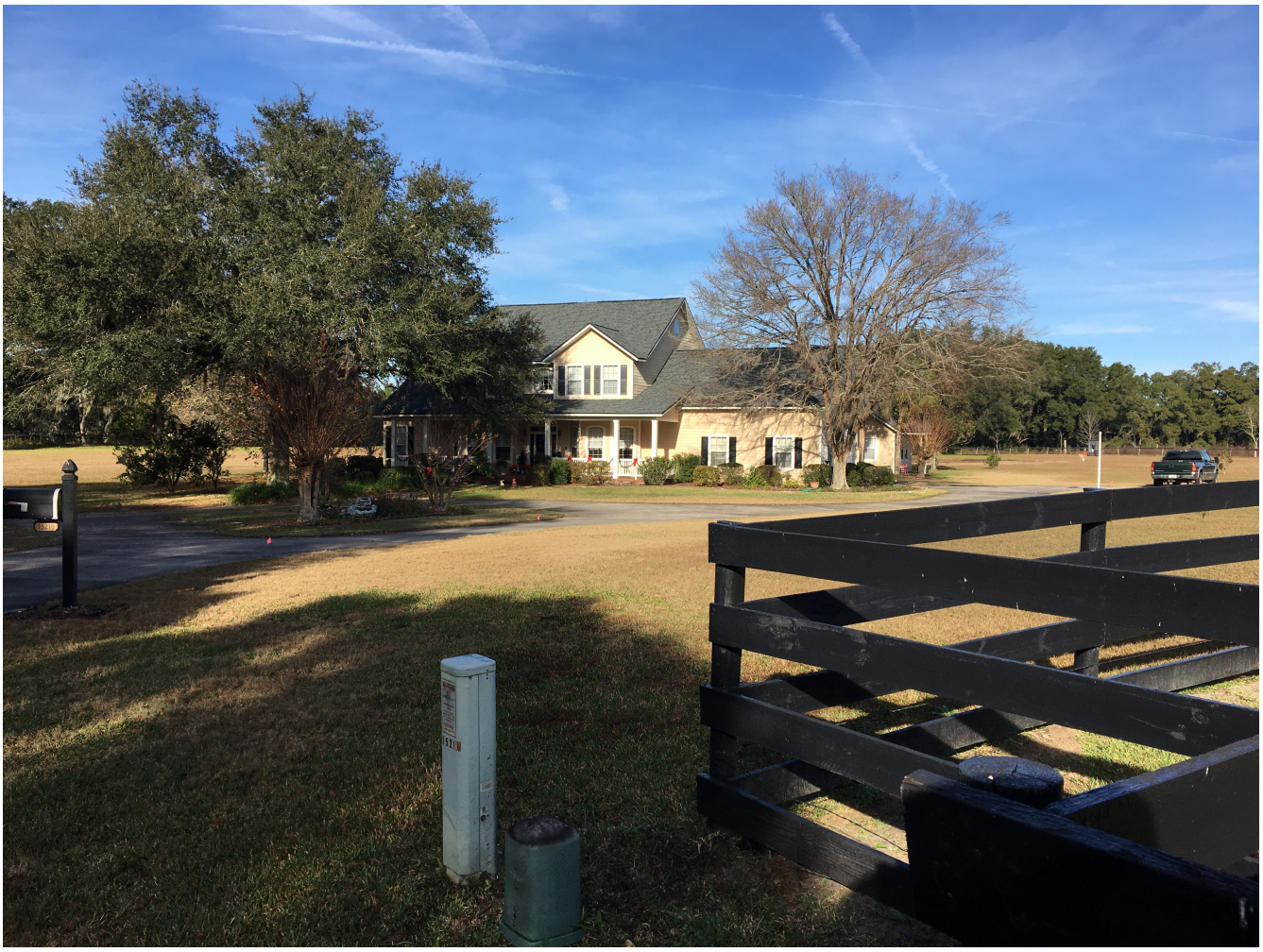
9 https://www.law.cornell.edu/cfr/text/47/95.303
10 Gainesville ordinances Sec 30-2.1-Definitions
11 This *exclusion* for towers built or utilized by governmental units would appear to even remove the limitation to 80 feet of towers within historical districts -- because the definition then does not apply to Sec. 30-8.41. - Nature park and public conservation/preservation areas district, subparagraph C(2)(c).

2. A vertical fiberglass device (with conductors hidden within) approximately the size and shape of a pool cue stick, mounted at some height above the ground. (Use for "VHF" (very high frequency) communications to shelters for the citizenry or points of distribution or fire stations, to provide communications in the event that normal systems are overloaded or fail.)

3. A miniature type of "TV Antenna" (Yagi directional antenna) that might well be smaller than a McDonald's plastic tray, pointed at a specific repeater tower. (Used for police/fire/public service monitoring or communication, or for the SLERS system to connect to other counties or the State of Florida through repeaters on towers.) A possible example of such an antenna can be found commercially at: https://www.westell.com/products/cs03-003-430

How long, thin wires meet the intent and goals and requirements of Gainesville Ordinances

Although Sec. 30-5.33 does not appear to ever actually refer ever to this type of antenna, it is fairly apparent that these antennas comply nicely with the stated goals of the Ordinance. For example, here is a very high resolution, street-view photograph of a building structure which actually has FOUR of these type antennas. Can you find them?



It is very unlikely that you would be able to pick out even one or two of the long, thin wire antennas, even if you blow the photograph way, way up. One of them is behind the structure (exactly as paragraph (H) of the ordinance encourages towers to be placed in the rear yard). One of them is right out in front and the entire structure should be visible -- but the acuity of the human eye is not sufficient from a street view. Another is at an inconvenient angle, so that your chances are even less, and

somewhat hidden by a tree, even with no leaves. The final one run vertical up and over the large oak just in front of the left side of the structure.

So it seems apparent that long, thin wire antennas (used for shortwave, "HF" communications to counties, states and Federal Government in both Amateur and DHS services) comply VERY well with the stated goals....

- **protect property values and minimize visual impact**
- **protect the natural features and aesthetic character of the city**

How Short Vertical Antenna devices comply with the Ordinance and goals

The new location for the Alachua County Emergency Operations Center is located along a very busy street, which is a corridor for high power electrical lines. There are massive electrical poles with high tension wires high above the street, and an existing massive power pole on the east side of the existing building, with two very large transformers -- and all of these were permitted as necessary for utility of the public and the occupants of this structure to have electricity.

By contrast, our needs for short-vertical **antennas**, which are far thinner than a power pole, only about an inch in diameter, and only five or six feet long, are minuscule. For the safety of the public, we have proposed four such antennas, to meet the simultaneous needs for monitoring or communicating on several different potential emergency systems.

The mounting of these various antennas can be on more than one of several supports:

1. Using existing flagpole structure ("collocation" in the language of the permitting ordinance[12]
2. Using existing oak trees[13]
3. Using a modest 45-foot telescoping, tilting metal tower[14] that is considerably less massive than the power poles already running up and down 8th Avenue.

Typical 5-ft vertical antenna

METAL TOWER ADVANTAGES

Each of these possibilities is useful and important, but the metal tower option has particular advantages for the safety and welfare of the citizenry of Gainesville and Alachua County, because it can be retracted and tilted down during high winds and has a better chance of surviving than some of the other options!

We STRONGLY recommend a telescoping / tilting aluminum tower[15] to minimize both risk of damage and also to dramatically reduce government costs for maintenance. If a tower is mounted on the top of a roof, very expensive TOWER CLIMBERS will be required to perform routine maintenance. Over a period of a few years, this will become quite an expense and will reduce the operational readiness of the antenna and transmission line. By contrast, installing a tilting tower (telescoping is also desirable), maintenance of weather damage to connectors, coaxial cable, antennas can be performed by GROUND PERSONNEL (volunteers) at essentially no cost to the government.

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12 Our proposed antenna solutions include placing one or two VHF vertical antennas on the west existing flagpole beside the building.

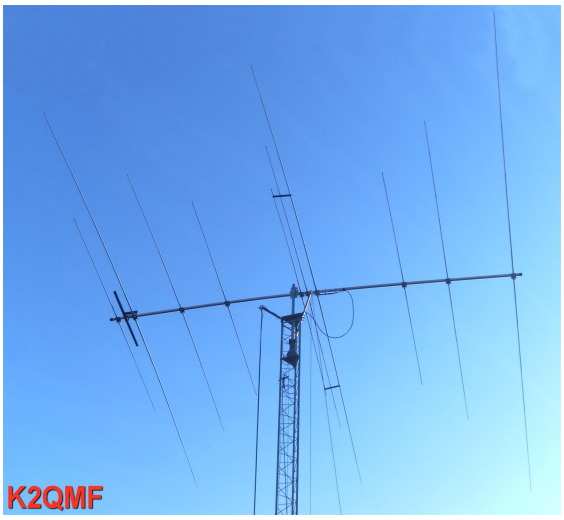
13 While placing VHF vertical antennas within the branches of an oak tree will conceal them, it raises the risk that they will be lost in a high-wind event where the oak may be damaged or toppled.

14 A tilting, telescopic metal tower may be the most effective and most robust solution against the weather disasters for which the EOC must be prepared, because the height can be adjusted downwards when not needed, upwards when there is a significant need to reach distant shelters, and tilted down to the ground for both inexpensive maintenance and also to protect from extremely high winds beyond its design specifications.

15 Although we recommend an aluminum telescoping tower for maintenance reasons, galvanized steel towers are even available on Amazon: https://www.amazon.com/ROHN-45G-Basic-Tower-Kit/dp/B07HJBS9HJ

We do NOT recommend placing all the VHF/UHF vertical antennas on ONE tower as this will lead to overload of various receivers. Our proposal is to take advantage of pre-existing tree structure and flagpole structure for the engineering advantages of reduction in receiver overload.

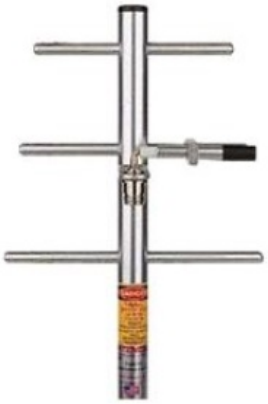
Since paragraph (H) already specifies that metal towers of up to **80 foot height** can be easily accommodated **even in residential areas** -- and those might normally support quite significant Yagi antenna systems with booms up to 24 feet in length and widths of aluminum poles as far as 16 feet in either direction -- the request that we suggest is **far, far less intrusive, and would be installed in a semi-industrial location, than those already acceptable by paragraph (H)**



Massive 24-foot boom "YAGI" directional antenna often placed on amateur towers, and apparently completely acceptable by Paragraph (H). ***Our requests are far less intrusive.***

How 800MHz Antennas Comply with the Ordinance.

Typical 800MHz antennas may be either only a few-inches long vertical piece of metal whip, or may be a miniature directional Yagi type antenna, which looks like a tiny TV antenna. The size is often smaller than a "McDonald's Tray" for example. These are innocuous and often even overlooked, and can generally be mounted on a side of the building and pointed at the proper repeater tower.



APPENDIX: Review of the Applicability of Paragraph G

1.	General. This subsection is relevant to all new PWS antennas and collocated PWS antennas that increase the height of the structure or are not otherwise preempted pursuant to F.S. § 365.172(11). PWS antennas attached to existing structures shall be permitted as an accessory uses in all zoning districts. PWS antennas may be located on existing commercial, industrial, office, institutional or multiple-family structures. PWS antennas shall not be mounted on single-family structures or on two-family structures. PWS antennas may extend a maximum of 20 feet above the roof line or the highest point of the existing structure on which they are mounted.' d. The height of a rooftop installation shall be measured from the finish level of the portion of the roof on which the antenna is mounted. e.PWS antennas placed on a legally non-conforming structure shall not be considered an expansion of the structure. Existing PWS antennas that were legally installed at the time of initial installation may be repaired, replaced and/or relocated at an equal or lower height on the existing structure.	Based on the Definitions provided within the Ordinances, Paragraph 1 has no applicability to either licensed Amateur Radio Service or to the Department of Homeland Security SHARES radio system. It does not appear to have applicability to any of our backup radio functions, equipment, or antennas. Personal wireless services (PWS) means commercial mobile services, unlicensed wireless services and common carrier wireless exchange access services as defined by federal regulations. Personal wireless service (PWS) antenna means a device used for sending or receiving radio signals used by a personal wireless service provider (a company authorized by the FCC to operate a PWS system), including the support structure used to hold the antenna at a particular height. This does not include accessory personal use antennas as allowed by the City Code of Ordinances.
2	Visual compatibility for PWS antennas not located on a communication tower. a.All new PWS antennas and collocated PWS antennas that increase the height of the structure or are not otherwise preempted pursuant to F.S. § 365.172(11), shall be placed on the structure out of public view to the greatest extent possible. If this is not practical, screens or enclosures are required	Similarly to (1) above, by the definition provided of Personal Wireless Services, this has no applicability to the radio services needed by Emergency Management.

	to conceal the facility from public view in a manner that is compatible with the scale, color and architectural character of the structure. b.If it is necessary to place the PWS antenna in public view, for aesthetic purposes it shall be integrated into the structure in such a manner that it is compatible with the scale, color and architectural character of the structure to the greatest extent practical. c.Equipment shelters used in conjunction with such PWS antennas shall be located inside the existing structure or hidden from public view, or made compatible with the scale, color and architectural character of the structure. d.A PWS antenna shall comply with the required setbacks for the zoning district in which it is located.	
2	Development plan approval. Development plan approval in accordance with article III, as applicable, and compliance with the application requirements stated below in subsections L.1., 6., and 11. are required prior to the issuance of a building permit for all new PWS antennas and collocated antennas that are not otherwise preempted pursuant to F.S. § 365.172(11).	Again, as noted above, the radio services needed by Emergency Management are not Personal Wireless Services based on the definitions provided, so this paragraph is not applicable.