



Siting Telecommunications Towers

Dear Reader:

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We hope this information will be useful to you; reference to it will assist you with many of the questions that will arise in your tenure with municipal government. However, the *Tennessee Code Annotated* and other relevant laws or regulations should always be consulted before any action is taken based upon the contents of this document.

Please feel free to contact us if you have questions or comments regarding this information or any other MTAS website material.

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Siting Telecommunications Towers

Reference Number: MTAS-752

With the widespread use of cellular telephones and similar wireless electronics, cities are receiving an increasing number of requests from telecommunications companies to place antennas and towers in their communities. Many of these towers are quite large and can pose safety risks for neighboring residents and businesses. Communications towers may conflict with the aesthetics of the neighborhood and generate concerns from residents when applications are received at city hall.

A modern city should have a strategy in place before it considers a request from a telecommunications service to erect a tower. The strategy should recognize the important role that telecommunications services play in the community and not unduly prohibit tower construction. At the same time, however, the policy should assure that citizens will be protected against shoddy construction and ensure against an unreasonable proliferation of such antennas in the community.

Federal Laws Affecting Tower Placement

Reference Number: MTAS-1452

Section 704 of the 1996 Telecommunications Act contains several key provisions affecting the authority of municipalities to regulate the placement of towers for cellular telephones, personal communications services, and other similar transmitters. Generally, the act preserves municipal zoning authority as it relates to radio towers and their siting, but it also creates three key protections for firms seeking to erect a tower:

- Local ordinances may not “unreasonably” discriminate among providers of functionally equivalent services. Tower siting policies must not favor one company, or one technology, over another;
- Local government may not impose a blanket prohibition against the placement of telecommunications towers; and
- Local ordinances may not impose more stringent “environmental effects” limits on radio frequency emissions than those adopted by the Federal Communications Commission (FCC).

A municipality would do well to encourage colocation of telecommunications facilities — essentially the sharing of a single tower by multiple telecommunications services. Such practices have the potential to reduce the proliferation of towers. Federal law encourages this practice and gives cities some leverage to assure that legitimate efforts are made to effect colocation. 47 U.S.C. 251(c)(1) and 47 U.S.C. 251(c)(6) discuss the “duty” of telecommunications service to negotiate in good faith for colocation opportunities. Municipal ordinances should reflect this obligation, and final tower approval should depend on an applicant’s demonstration of these efforts.

Federal law allows cities to deny construction permit applications for telecommunications towers. The denial, however, must be based on a reasoned approach, otherwise the FCC is authorized to pre-empt the local decision and grant the construction permit.

Without adopting a telecommunications tower policy, it is doubtful that a municipality’s denial of a construction permit will be seen as resulting from a reasoned approach.

State Laws Affecting Tower Placement

Reference Number: MTAS-1453

T.C.A. § 13-24-304 specifically authorizes municipalities that have adopted planning and zoning regulations to regulate the siting of telecommunications towers. However, T.C.A. § 13-24-305 places limits on a city’s power to regulate minor alterations to pre-existing antennas.

T.C.A. § 65-21-116 requires owners of telecommunications towers to submit information concerning tower location and ownership, a copy of the deed or lease for the property, and related information to the Tennessee comptroller of the treasury. The comptroller’s Web site provides forms that can be downloaded for this reporting.

Otherwise, there are no state laws concerning placement of telecommunications towers.

Laws of Nature Affecting Tower Placement

Reference Number: MTAS-1454

The physics of radio signal transmission cannot be altered by the mere adoption of man-made laws and ordinances. Radio signals obey the physical laws of the universe, and government can no more repeal or amend these laws than it

can the law of gravity.

One of the physical laws governing the placement of telecommunications towers is that antennas that are placed high in the sky tend to transmit and receive much better than those placed low to the ground. Cities that (inadvertently or otherwise) limit the placement of antennas to low-lying areas may effectively be prohibiting telecommunications towers in their community and inviting legal challenge.

From the perspective of the telecommunications provider, the ideal locations for telecommunications towers include:

- The tops of hills and mountains;
- Atop high-rise office buildings, apartments, water towers, etc.; and
- On existing telecommunications towers, if space is available.

Placement in the downtown area of a community has unique advantages and disadvantages that the tower owner must consider. The obvious advantage is that the central business district is where the city's tallest buildings are likely to be located. They can be used to achieve the altitude needed for radio signal transmission and reception. On the downside, buildings in a downtown area can cause wave reflection that results in poor signal quality. Additionally, certain commercial and industrial activity in a downtown area can contribute to electromagnetic interference of radio signals.

When determining which areas of towns are suitable for the placement of telecommunications facilities, city planners would do well to include locations where the physical environment favors the transmission and reception of radio signals. Conversely, limiting telecommunications towers to areas where radio signal transmissions or reception is weak may invite legal challenge.

Laws of Economics Affecting Tower Placement

Reference Number: MTAS-1455

Tower construction may be divided into two general types:

- Guyed towers: Towers that depend on the attachment of guy wires to hold them in place and to protect against the forces of wind and ice.
- Self-supporting towers: Towers that are rigidly constructed and, once attached to a base anchored in the ground, need no additional support to withstand the forces of nature.

Guyed towers tend to use a latticework construction. Self-supporting towers can use latticework construction, but the more modern approach is the monopole — a tapered, rigidly built spike or pipe placed perpendicular to the ground.

Inch for inch, self-supporting tower structures generally are more expensive to construct than guyed towers.

Despite their relative lower cost of construction, guyed antennas may ultimately be more expensive for the telecommunications provider due to the amount of real estate needed for this type of construction. For example, a 200-foot tower, 80 percent of which is to be guyed, will require nearly two full acres of real estate to achieve the necessary rigidity. ^[1] In a community having high real estate values, installing a guyed tower may not be a viable option.

As a city plans for the placement of telecommunications towers, it must understand these economic realities.

[1] Roger L. Freeman, *Telecommunication Transmission Handbook*, Second edition. John Wiley & Sons, New York, 1981, page 242.

Goals for a Municipal Tower Policy

Reference Number: MTAS-753

Seven Factors to be Addressed by a Tower Siting Ordinance

A well-written tower ordinance will:

- Encourage a modern, nondiscriminatory and competitive telecommunications system within the community;
- Protect the health, safety and welfare of the citizens in the community;
- Discourage antenna or tower proliferation and protect against visual blight and damage to community aesthetics;
- Avoid interfering with other types of telecommunications (fire, police, and other emergency communications);
- Create a reasonable and efficient permit application and review process;
- Assure that the tower will be maintained throughout its lifespan; and

- Comply with the permit requirements of the Federal Communications Commission (FCC) and the Federal Aviation Administration (FAA).

General Siting Strategy

An antenna facilities ordinance should identify areas of the community where the placement of towers will be encouraged. Generally, these will be:

- Areas where local zoning favors the placement of antenna towers. Usually, these will include industrially zoned properties, agricultural land and other sparsely populated sections of town.
- Areas where antenna towers may be permitted by issuing a special use or conditional use permit. Issuing the special use permit is subject to geographic and topographic conditions, population density and the physical properties of the proposed tower. In these areas, towers might be permitted if it can be demonstrated that they will not pose a safety risk or damage neighborhood aesthetics. Commercial areas, public rights-of-way and similar areas are included in this group.
- Areas where antenna towers are forbidden. Low density residential neighborhoods and areas near airports, helipads and other highrisk facilities that could be threatened by placement of an antenna tower. The FCC is required to evaluate the impact of a proposed tower on historic sites, wilderness areas, wildlife preserves, Indian religious sites, flood plains and wet lands, and the city might consider linking its permit approval to the FCC's review.

Within zoning districts where tower placement might be acceptable, cities should establish priorities that favor tower construction techniques that minimize environmental and aesthetic concerns. A city's telecommunications ordinance may, for example, encourage antenna placement on existing radio towers or other tall structures or buildings and require applicants who propose to construct new towers to inventory such available sites in the community and to explain why they were not proposed for site approval.

Compliance with FCC and FAA Regulations

A proposed telecommunications tower with a height of 200 feet or more above grade at the site must be cleared by the FAA and registered with the FCC. Towers proposed for construction within 20,000 feet of an airport runway may be required to be similarly registered with the FCC, depending on topography and the length of the airport runway. The FCC maintains an interactive website that allows users to submit key information about antenna proposals to determine whether FCC registration is necessary. The website provides automatic and immediate notice to the user about the need to register the proposed tower. [2]

Exceptions are granted for proposed towers that will be "shielded" by existing, permanent structures or natural terrain of equal or greater height, in congested municipal areas where there is "no reasonable doubt" that the structure so shielded will not affect air navigation. The phrase "no reasonable doubt" is open to fairly broad interpretation. Any misjudgment in this area could have tragic consequences, and cities would do well to leave such decisions to the FCC and the FAA. Cities should also be aware that if such shielding is ever removed (i.e., building demolition), a previously unregistered tower must be registered with the FCC.

The Antenna Facilities Ordinance should stipulate that the city will not consider any tower construction permit unless and until the applicant has completed the FCC and FAA registration process, if required.

[2] http://wireless2.fcc.gov/UlsApp/AsrSearch/towairSearch.jsp;JSESSIONID_AS... [1]

Design Criteria

Reference Number: MTAS-756

Specific standards will vary from one city to the next, as geologic, topographic and other environmental factors change. The basic guideline is to adopt construction standards that address the following:

- **Unit strength:** The tower design, the materials with which it is constructed and the methods used in construction must be sufficient for the tower to support its own weight plus the weight of any antennas it may support. Care should be taken to assure that unit strength is adequate to support antennas that may be added to the structure after the initial construction is completed.
- **Foundation strength:** The engineering of the foundation must take into account geologic and seismic factors that may affect the stability of the structure.
- **Wind loads:** The structure should be of sufficient rigidity to withstand the highest wind velocities prevalent in the area. Standards may be more stringent in heavily populated areas than in rural setting, for taller structures than for shorter towers, etc.
- **Ice loads:** Telecommunications towers must be designed to withstand ice storms typical for the environment in which they are located.

The American National Standards Institute (ANSI) and the Telecommunications Industry Association (TIA) have jointly developed nationally recognized design standards for telecommunications towers, published as "ANSI/TIA Standard 222

— Structural Standards for Antenna Supporting Structures and Antennas, Revision G.” Tennessee cities should procure a copy of these standards and include them by reference in their telecommunications ordinances.

The ANSI/TIA tower design standard contains a complicated mixture of engineering formulas and statistical analyses. For this reason, any review of a proposed tower construction is best left to a qualified and experienced structural engineer, one who can subject the proposed design to sophisticated computer analysis. Tennessee cities should require all tower plans to bear the stamp of a professional engineer registered in the state of Tennessee.

Telecommunications: Model Ordinances

Reference Number: MTAS-757

Cities needing to update their telecommunications ordinance should avoid the urge to simply adopt a model telecommunications ordinance or the ordinance and specifications currently in place in a neighboring community. While many of these ordinances are quite good, there are unique geographic, environmental, and political factors in every community that should be carefully considered before adopting an ordinance. Model ordinances should be used as a starting place for cities wanting to adopt a modern telecommunications ordinance, but such ordinances should be modified to reflect the local situation.

An example of telecommunications facilities ordinance: Model Wireless Telecommunications Facility Siting Ordinance; PCIA The Wireless Infrastructure Association, 2012 [2].

Issues Regarding Siting of Telecommunication Towers

Reference Number: MTAS-758

Specifics to be Decided by the City

In modifying any particular model ordinance, your city should make amendments that will answer the following questions, based on your community’s needs and preferences:

1. What types of antennas will be affected by the ordinance?

Cities usually exempt certain types of antennas from their zoning regulations. These include television satellite (dish) antennas and “receiveonly” antennas, which can be as simple as a piece of wire stretched between trees to receive shortwave radio broadcasts.

Counties often exempt amateur (or “ham”) radio towers from compliance with their antenna facilities ordinance, presumably on the grounds that such facilities are built in sparsely populated areas and will not affect neighboring properties. Cities, however, should carefully consider regulating amateur radio towers that are excessively high.

Some city ordinances require construction permits for amateur radio towers that exceed specific heights (for example, 45 feet for a ground-mounted antenna and 30 feet for one mounted on a building).

2. How shall we encourage colocation?

Out of a concern that their communities may one day be overrun with antenna towers, some cities require tower applicants to conduct studies to determine if other facilities in the area would be suitable for antenna placement. These might include space on an existing tower that could be leased by the applicant to place an antenna or space on buildings, water towers, bridges or other tall structures that might be leased for antenna placement.

If the applicant’s tower proposal is otherwise acceptable, some cities require that the tower be built in such a way that it can accommodate other antennas in the future, thus reducing the need for more antennas in the area. In cases where a new tower is proposed, some cities require applicants to thoroughly inventory all colocation opportunities in the community and explain why such opportunities have been rejected by the applicant.

Colocation studies are expensive (the costs should be paid by the applicant) and may be controversial. Still, such investigations can prevent the creation of “antenna farms” in certain areas of town.

3. How do we protect the community if the tower is eventually abandoned?

A city may opt to require tower applicants to post a performance bond guaranteeing the safe demolition of a tower in the event it is ever abandoned. This can be valuable to the city in the aftermath of a tornado or an occurrence where the tower owner may not have the resources to repair or demolish the tower.

4. How can we protect the community against poor maintenance of the tower?

The city might consider a requirement that telecommunications towers are inspected periodically by a qualified professional engineer registered in the state of Tennessee, and that a copy of such inspection report be filed with the municipality’s building inspector.

5. How do we recover the cost of evaluating the permit application?

Properly evaluating a permit application requires consulting with a variety of professionals whom the city may not regularly employ (i.e., structural engineers, telecommunications engineers, telecommunications lawyers, etc.). In developing its tower ordinance, the city should take care to see that the cost of hiring such consultants is recovered in the applicant’s

permit fee. Due to the expertise required, it is doubtful that a city's normal building inspection fees will be sufficient; a separate fee schedule should be considered with all such fees paid by the applicant prior to permit review.

6. Should the city permit the tower owner to add facilities or change the design?

The city should require the tower owner to secure an additional permit for each antenna proposed for placement on the tower. This will assure that (a) wind loading standards are not exceeded, and (b) police, fire and emergency radio communications are not degraded or disrupted. The original construction permit likely will not take these factors into account.

7. For how long should a tower construction permit be valid?

The city should set reasonable deadlines for a permitted tower construction to be completed. The permit should not be open ended. The ordinance should encourage prompt completion and allow the city to revoke permits that fail to meet deadlines.

8. How can the city minimize the confrontational aspects of the permit process?

The city can encourage the development of modern, state-of-the-art telecommunications by adopting and uniformly enforcing a clearly written tower construction ordinance. Additionally, the city might consider a two-stage application process. In the preliminary stage, the applicant is made aware of the city's construction standards before incurring the costs of developing final construction plans. This may help the applicant avoid expensive, "back-to-the-drawing-board" costs after presenting final plans to the city.

9. How can the community's aesthetics be protected?

To most people, a telecommunications tower will be seen as having a negative impact on the landscape of the community. There are a few ways such an impact can be mitigated. The city should consider adopting an ordinance that:

- Limits the number of towers in the line of sight of historic neighborhoods and other scenic resources;
- Encourages the planting of vegetative screening or construction of screening fences;
- Requires setbacks that minimize interference with scenic resources; and
- Requires the telecommunications facility to be painted colors that blend with the surrounding natural or architectural environment. Muted colors, earth tones and subdued hues should be encouraged.

10. How can we encourage the owner to keep the tower secure?

The city should consider a requirement that all telecommunications towers are fenced to discourage intruders. Additionally, cities can require the owner to include telemetry and alarms to alert when illegal entry occurs or when tower lights are not functioning.

Siting Telecommunication Tower Resources

Reference Number: MTAS-759

A good information source for siting telecommunications towers can be found at the website of the Federal Communications Commission [3].

The FCC's preliminary application to construct or alter a telecommunications tower (FCC Form 854 [4]).

Forms for notifying the FAA of a proposed tower construction or alteration (FAA Form 7460-1) are difficult to access via the Internet. Instead, prospective applicants should contact the FAA's regional office at 1701 Columbia Avenue, College Park, GA 30337 or call (404) 305-5685.

Forms [5] for registering telecommunications towers with the Tennessee comptroller of the treasury

Links:

- [1] http://wireless2.fcc.gov/UlsApp/AsrSearch/towairSearch.jsp;JSESSIONID_ASRSEARCH=VdNnNnpdcg1J4y8k33dsfmCPLBGIXfy683wJxTC6nK2HFcpjGKdF!108987
- [2] https://wia.org/wp-content/uploads/Advocacy_Docs/PCIA_Model_Zoning_Ordinance_June_2012.pdf
- [3] <http://wireless.fcc.gov/siting/>
- [4] <http://www.fcc.gov/Forms/Form854/854.pdf>
- [5] <http://www.comptroller.tn.gov/OSAP/sapform.asp>

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