WINNING CITY APPROVAL

to erect an

AMATEUR RADIO TOWER

in Boca Raton

Presented by

Ray Smolenski – N4RU

7 May 2019

LIFTING THE FOG OF UNCERTAINTY

Seeking the City's Approval Criteria for Amateur Tower Erection often leads to a classic "Mexican Standoff"

- The amateur lacks definitive regulatory guidance upon which to base a detailed tower proposal
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MUNICIPAL CODE TERMINOLOGY

”Tower” - Commercial Cellular Telecommunications Structure

“Antenna Support Structure” - Amateur Radio Tower (an **uninhabited “accessory structure”**)

Each is governed by vastly different municodes

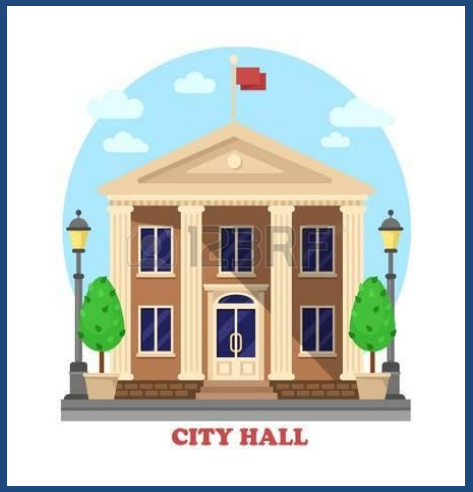
HOA - Home Owners’ Association

CC&R’s - Covenants, Conditions and Restrictions

COMMON AMATEUR TOWER PLANNING ERRORS

1. Failing to understand the **GOVERNING ENVIRONMENT**
2. Relying upon **INVALID STANDARDS & ASSUMPTIONS**
3. Taking **PROBLEMATIC "SHORTCUTS"** to reduce expense
4. Ignoring the **REQUIREMENT FOR TOWER CERTIFICATION** by a Florida registered Professional Structural Engineer (P.E.)

GOVERNING ENVIRONMENT



Authority Having Jurisdiction (AHJ)

Codes and Standards Enforcement

- Boca Raton "Municode" (ordinances)
- Florida Building Code (FBC) - 2017
  - EIA/TIA-222 Rev. G Standard
- National Electrical Code (NEC) - 2017
- Underwriters Laboratories Standards (UL Listed)

City officials serve as AHJ for Boca Raton residents.

AHJ alone responsible for **"interpreting"** Codes & Standards

P.E. certifications enable AHJ to transfer liability to the P.E.

GOVERNING ENVIRONMENT (cont'd)

HOA vs. non-HOA

HOA properties are governed by the **municode & CC&R's**

- **CC&R's within some HOA's automatically expire** after 20-25 years from date of inception unless renewed

GOVERNING ENVIRONMENT (cont'd)

HOA vs. non-HOA

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Non-HOA properties are governed by the **municode only** *

- **Over 42 non-HOA developments exist in Boca Raton** but other factors can still impact tower feasibility
  - ♦ Most pre-1980 homes have overhead FPL service
  - ♦ Lower priced homes are often sited on 50' x 100' lots
  - ♦ Higher priced homes often have large backyard pools

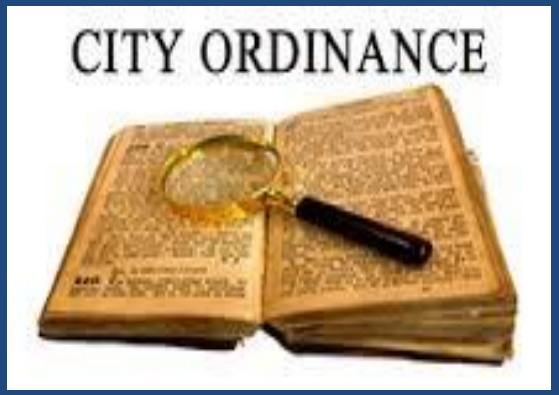
(*) Assuming no deed restrictions

42 Non-HOA Developments in Boca Raton

FEATURING SINGLE FAMILY HOMES PRICED FROM $250k-$900k [median ~ $500k]			
American Homes at Boca Raton	Boca Woods	Lake Floresta Park	Spanish Village
Bel Marra	Boca Raton Heights	Montez Gardens	Tunison Palms
Bermuda Square	Boca Raton Hills	Old Floresta	University Gardens
Bible Conference Estates	Boca Raton Square	Palm Beach Farms	University Heights
Boca Alta	Camino Gardens	Paradise Palms	University Hill
Boca Harbour	Camino Lakes	Palmetto Park Terrace	University Park
Boca Islands	Chatham Hills	Palmetto Park West	Villa Rica
Boca Keys	Country Club Village	Pinelands North	Whisem
Boca Madera	Esterly	Royal Oak Hills	Winfield Park
Boca Teeca	Hidden Valley	Sandalfoot Cove	
Boca Villas	Kings Court	Spanish River Land	

Information courtesy of Margit Weir
Coldwell Banker – Boca Raton office

GOVERNING ENVIRONMENT (cont'd)



Boca Raton Municipal Code is available online

https://library.municode.com/fl/boca_raton/codes/code_of_ordinances

- A very convenient and useful resource
- AHJ interpretation of municode provisions may differ substantially from one's personal interpretation

GOVERNING ENVIRONMENT (cont'd)

Boca Raton Municipal Code includes:

Zoning Code Provisions Applicable to **Amateur Antennas**
[Municode Section 28-1300]

- Amateur antennas are a **"permitted use"** in Boca Raton

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- **Zoning variance** req'd if antenna height exceeds 50 ft.
  - ♦ Zoning variance requests
    - --- Require costly application fees
    - --- Require public notice
    - --- Invite comment from nearby neighbors
    - --- Often are ultimately denied

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- Subject to a **minimum 5 ft. setback** from property lines
- Antenna must not be sited in a front yard

GOVERNING ENVIRONMENT (cont'd)

Boca Raton Municipal Code includes:

Zoning Code Provisions Applicable to **Amateur Towers**
[Municode Section 28-1295]

- Tower base must have a **minimum separation of 10 ft.** from your home's foundation **whenever the tower base is set in concrete**
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- Subject to a **minimum 5 ft. setback** from property lines
- Tower must not be sited in a front yard

GOVERNING ENVIRONMENT (cont'd)

Boca Raton Municipal Code includes:

Building Code Provisions Applicable to **Tower Erection**
[Municode Section 19-29]

- **Building Permit is required for Tower Erection** with final signoff subject to:
  - **Electrical Installation Inspection & Approval**
  - **Structural Installation Inspection & Approval**

Electrical Installation Inspection & Approval

Requires bonding the amateur tower to the electrical service entrance ground electrode with UL Listed material

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- AWG #10 or larger diameter wire
- Wire placed in conduit buried just below ground level
- Properly sized grounding clamps rated for direct burial

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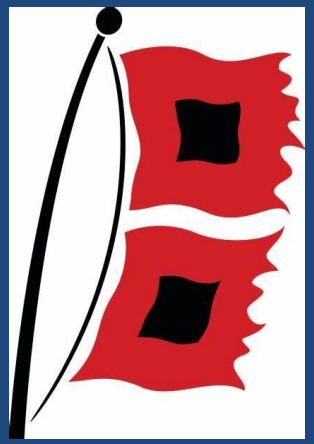
  - ♦ Compared to the current Rev. G Standard, the Rev. C & Rev. F Standards greatly understate an objects **Effective Projected Area**
- **Incongruities** between Rev. C / F / G can make P.E. analysis problematic

Structural Installation Inspection & Approval

- **Tower payload should never be identified**
  - Specify instead that payload will never exceed the structure's P.E. certified maximum rated Rev. G wind load

Structural Installation Inspection & Approval

- **FBC – 2017 within our wind zone area** mandates wind survival of **170 mph** for most **new (inhabited) construction**



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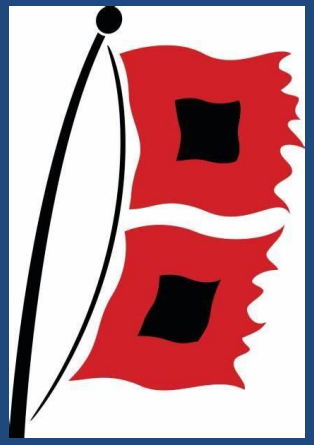

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  - **115 mph** min. wind survival for a **tower** deemed an **"accessory structure"** that is further classified as a
    - --- **Class 1 structure** (low hazard to human life/property) when erected in Boca Raton's **sandy soil** with
    - --- **Category 2 topography** (gently sloping landscape)
    - --- **Wind Exposure C** (flat surrounding region)

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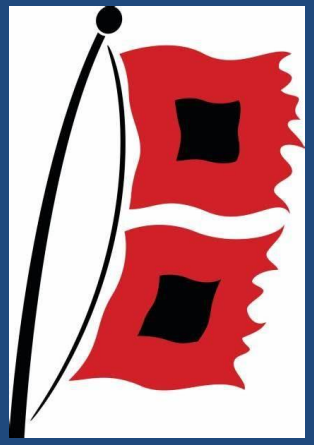

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- Tower erection must comply with OEM instructions

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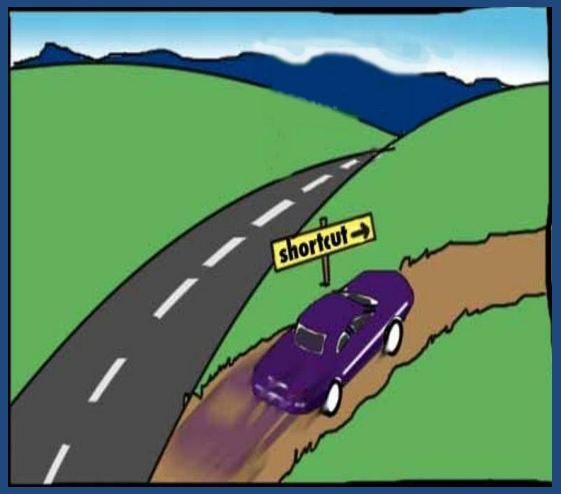
- **Do NOT assume that a longstanding tower recently observed in a given area would readily receive current AHJ approval in that same area**
  - ♦ Possibly erected years ago without a Building Permit
  - ♦ Possibly approved under a Standard now obsolete

  --- **The FBC is revised every 3 years** (next rev in 2020)
  --- **Revisions are quickly adopted into the municode**
  --- The EIA/TIA-222 **wind load provisions** within FBC **often grow more austere with each new revision**

INVALID STANDARDS & ASSUMPTIONS

- **Do NOT assume that the AHJ will provide a definitive checklist of its tower acceptance criteria upon request**
  - ♦ AHJ will only provide detailed guidance following receipt of a formal Building Permit application along with Building Permit fee and P.E. certifications

PROBLEMATIC "SHORTCUTS"



Failure to obtain a Building Permit
prior to amateur tower erection

- Upon discovery will result in a **triple fee penalty** for permit application submission post-erection
- **Tower remediation or removal will be required** if it is deemed unsafe during AHJ inspection
- Failure to comply with AHJ directives may subject the owner to **Code Enforcement fines** **or a** **property lien**

PROBLEMATIC "SHORTCUTS" (cont'd)

Acquiring a Used Tower is gambling

- May initially appear far less expensive than a new tower
- May or may not be structurally sound after years of service
- **<u>Proving</u> its Rev. G compliance to the AHJ may be difficult** particularly if the tower model is obsolete

PROBLEMATIC "SHORTCUTS" (cont'd)

- **OEM Rev. G compliant documentation will be non-existent** whenever
  - ♦ Tower model is old and no longer produced / supported
  - ♦ OEM is no longer in business (e.g., EZ Way)

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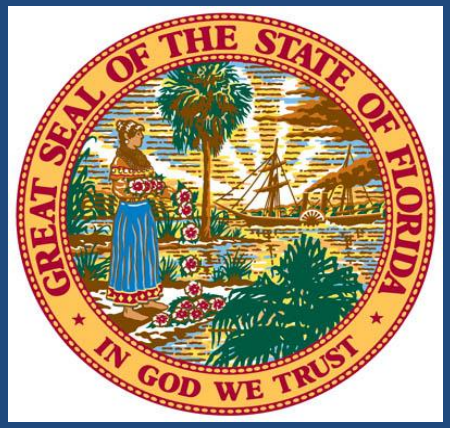
- **AHJ will consider a tower Building Permit application only if it includes documentation certified to Rev. G**

REQUIREMENT FOR TOWER CERTIFICATION

- **"Generic" (new) tower documentation from the OEM alone will not satisfy the AHJ**
  - ♦ Individually sealed, certified original, "site specific" engineering documents are an absolute requirement

REQUIREMENT FOR TOWER CERTIFICATION



- Tower manufacturers located outside of Florida may or may not be able to provide Rev. G tower documentation (for a fee) sealed by a P.E. registered in Florida

- The AHJ will not accept Rev. G tower documentation sealed by a P.E. registered outside of Florida

REQUIREMENT FOR TOWER CERTIFICATION

- **AHJ will deny a tower Building Permit if the related documentation is not certified to Rev. G by a Florida registered Professional Structural Engineer**

SUMMARY

KEY CHALLENGES

- Creating Building Permit materials to support your Goals and all AHJ Requirements while mindful of Placement Limitations

SUMMARY

KEY CHALLENGES (cont'd)

- **Creating Building Permit materials supporting your Goals and all AHJ Requirements while mindful of Placement Limitations**
  - Amount and Shape of Suitable Land Area Available
  - Distance from Tower Base to Property Boundary Lines
  - Distance from Tower Base (if concrete) to Home's Foundation
  - Location of Existing Easements & Underground Utilities
  - Possible Obstructions such as a Swimming Pool / Deck / Patio
  - Possible Obstructions within the Turning Radius & Elevation of a Rotating Antenna (e.g., tall trees, nearby structures, overhead electrical service wires)

SUMMARY

KEY CHALLENGES (cont'd)

- **Avoiding Common Tower Planning Errors** concerning:
  - Governing Environment
  - Invalid Standards & Assumptions
  - Problematic Shortcuts
  - Requirement for Tower Certification

SUMMARY

KEY CHALLENGES (cont'd)

- **Finding a P.E. willing to certify any tower (even if new) on a "one-off" basis for a reasonable fee**
  - Relatively few Florida P.E. firms have **tower expertise**

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  - Mid and large size P.E. firms often have **minimum fees** that are as high as 50% of the price of a new tower
    - **A reasonable fee** for P.E. certification is **~ $500**
    - P.E. certification consists of sealed engineering drawings with a 1-page, sealed, letter verifying tower compliance with FBC-2017 & EIA/TIA-222 Rev. G
    - **Detailed P.E. calculations are not needed by the AHJ**

N4RU TOWER - AHJ APPROVED

Aluma model T-50XHD Tower

46’ @ full extension + 4’ mast
Two-section, Retractable, Tilt-over, Unguyed
Extra Heavy Duty Aluminum Tower (150 lbs.)
w/ Crank-up winch
w/ Tilt-over winch

hinge-bracketed atop

Aluma MP-2 Mounting Pole

14‘ Overall Length (8’ exposed above ground)
Galvanized Steel (225 lbs.)
4-in. dia. Heavy Wall
Mounting Pole
w/ (8) 13-in. diameter
underground stabilizing fins
embedded 6’ in compacted sand

QUESTIONS ?