July ARES Antenna Recommendations for the Alachua County EOC

email: 7/12/2017

----------HORIZONTAL ANTENNA MATERIALS----------

ANTENNA WIRE: Stranded copper clad steel #14 $0.19/foot, need 140 feet for horizontal antenna. https://thewireman.com/antennap.html #511

RG8 or similar 50 ohm coax. Similar products are RG213, or LMR400. Typical price runs $0.35-0.80 per foot in quantity. I understand you have plenty of this. For laying on the roof, you might prefer NOT to have the "ultra-flex" version as the center conductor can "move" in the fluffy insulation of this type.

If necessary to squeeze through the wall, you can switch to a smaller diameter 50 ohm coax such as RG58/U for several feet without any significant problem. I don't know the exact length you are going to need for the run from the horizontal antenna auto tuner on the outside wall to the inside radio room, but I would guess 150-200 feet to reach the antenna room.

450 ohm ladder line for horizontal antenna: (need 44 feet or less) http://www.amateurradiosupplies.com/product-p/30025.htm This is #14 made out of 19 strands for resistance to movement. 50-foot length for $31

Balun, waterproof, one for the horizontal https://www.gigaparts.com/MFJ-913.html/
I know this looks like it goes in the center of the antenna, but we are probably going to put it at the tuner end of the balanced feedline to make this antenna more resilient to hurricane force winds; this is how I've built mine also. $28 each.

Antenna Tuner Control Cable: Belden 9536 or similar,
$0.80/foot https://www.wireandcableyourway.com/belden-9536-24-awg-6-conductor-shielded-computer-cable.html

This needs to reach from the transceiver all the way to the tuner mounted on the wall. I don't know the exact distance, I'm guessing at 200 feet – you can buy a 500 foot spool of it for $140 which might be a better move: https://www.wireandcableyourway.com/24-awg-6-conductor-computer-cable-foil-shield-500ft-or-1000ft-spool.html Estimate at 200 feet: $158

End Insulators: (2 for horizontal,) http://www.amateurradiosupplies.com/product-p/10-72.htm
$4 each.

Ladder line strain-relief center insulator; one for horizontal: http://www.universal-radio.com/catalog/antsup/5461.html $13.

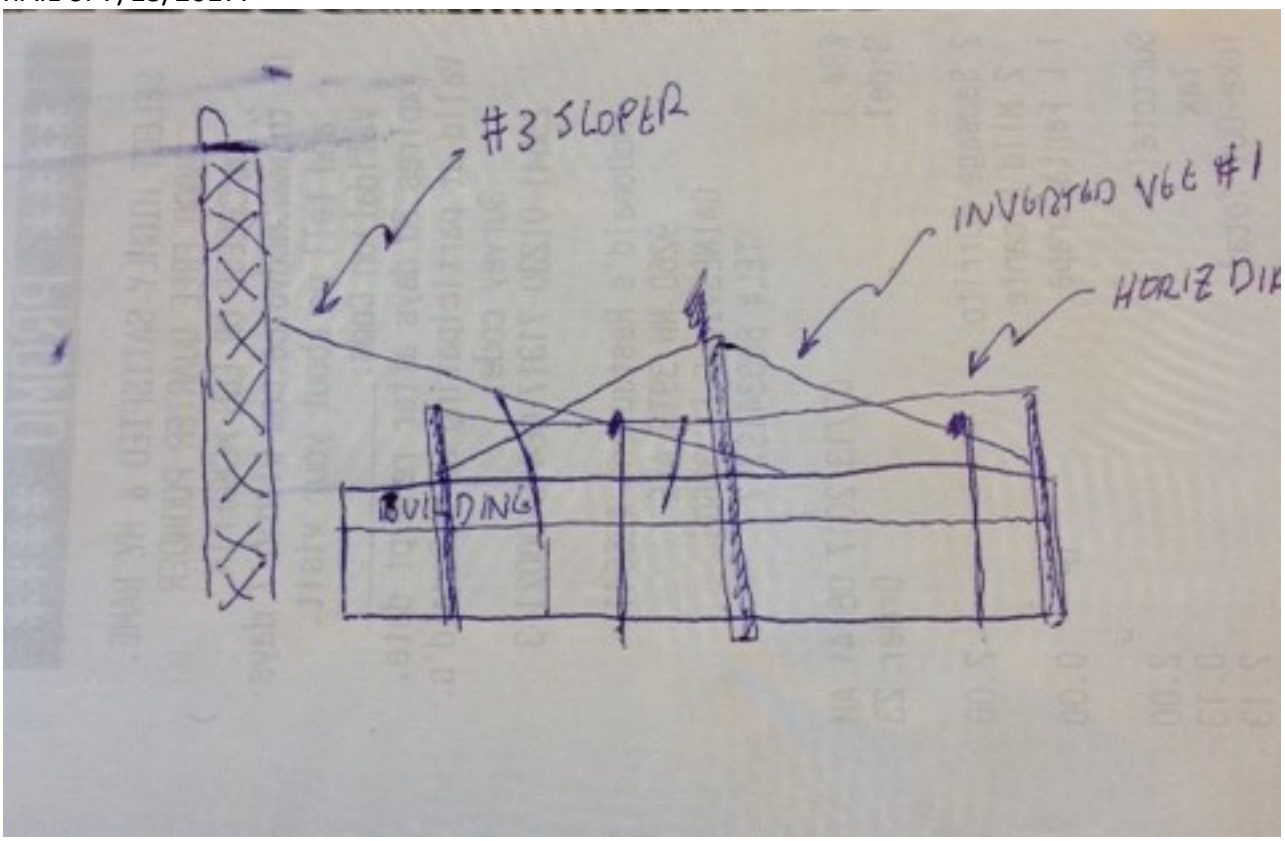
3 weatherproof pulleys, suggest a diameter of 2" or so. Suggest to handle 1/2" nylon rope.

Miscellaneous

PL-259 and other connectors. (I have a low-cost crimper and PL259 connectors for LMR400 sized cable and also for smaller cables)--but I bet Ryan has all that and much, much more!
Various screws to affix the tuner to the outside wall
Figure out some way to tie off the ropes on the lampposts--this might be as simple as wrapping them around several times or as complicated as using concrete screws to put in a cleat on each pole.

Some uv-resistant tye-wraps to make the coax and tuner controller wire stay where you want on the roof transit.

EMAIL of 7/13/2017:



We all put our heads together at last night's ARES meeting (we had a bumper attendance as our digital stuff is attracting more people) and came up with the following:

(At Jeff Capehart's suggestion, I have included some "stick figures" drawn on the back of my McDonalds's breakfast receipt. I'm not sure I got the scaling right, but they show the rear of your building, a couple of lamp posts, an inverted V from a central pole (that pole might be too high in the drawing), a horizontal dipole between two posts just a little taller than the lampposts, and a "sloper" coming off a point 40-50 feet up your tower. In general, we want the "broadside" of the antenna to go North-South (ends toward east west), and the two sides should either be "inline" or within 45 degrees of being "inline".)

I believe your building is roughly 18 feet tall and that the lampposts behind your building are about 25 feet tall. If those guesses are way off, then we might need to adjust these numbers. -->> It is important that the antenna have significant exposure at or above 25 feet above ground, and antenna structure below the roof of your building is of significantly lower communications efficiency (losses) . <<--- Thus I view the following antennas as virtually EQUIVALENT for both your amateur radio and possible SHARES usages, so that whichever is cheapest/most attractive would make for a good choice (in other words, they all would work):

1. Inverted V antenna with one pole on the back side of your building 35 feet high, with the highest point of the 130-odd foot antenna there, and the ends sloping down to tie-offs on the side of your building, roughly at roof level (18 feet above ground); the included angle between the two ends would be larger than 90 degrees (good) and less than 180 degrees, so we would call it an inverted Vee style. The cost advantage of this style is that it requires only ONE pole. Pulley on the one pole at least. (I would remind you that I'd be happy to put a rope through an oak tree and you could do this for free!!) #14 wire should be virtually invisible. Come over and try to see my antennas from more than 100 feet away.

2. Horizontal Antenna with two poles, one at each end, pulleys on the ends for sure, each pole as tall or maybe 2-3 feet taller than the lamp posts. I would suggest just putting one pole somewhere near your loading doc, and another pole 140 feet east of there, along the rear of your building. I'd try to put the poles on YOUR side of the parking lot --- but if you need to put them on the TREE side of the parking lot that will still work for both this antenna and #1 above also. Just longer balanced transmission line -- but that stuff is very low loss, which is why we're using it.

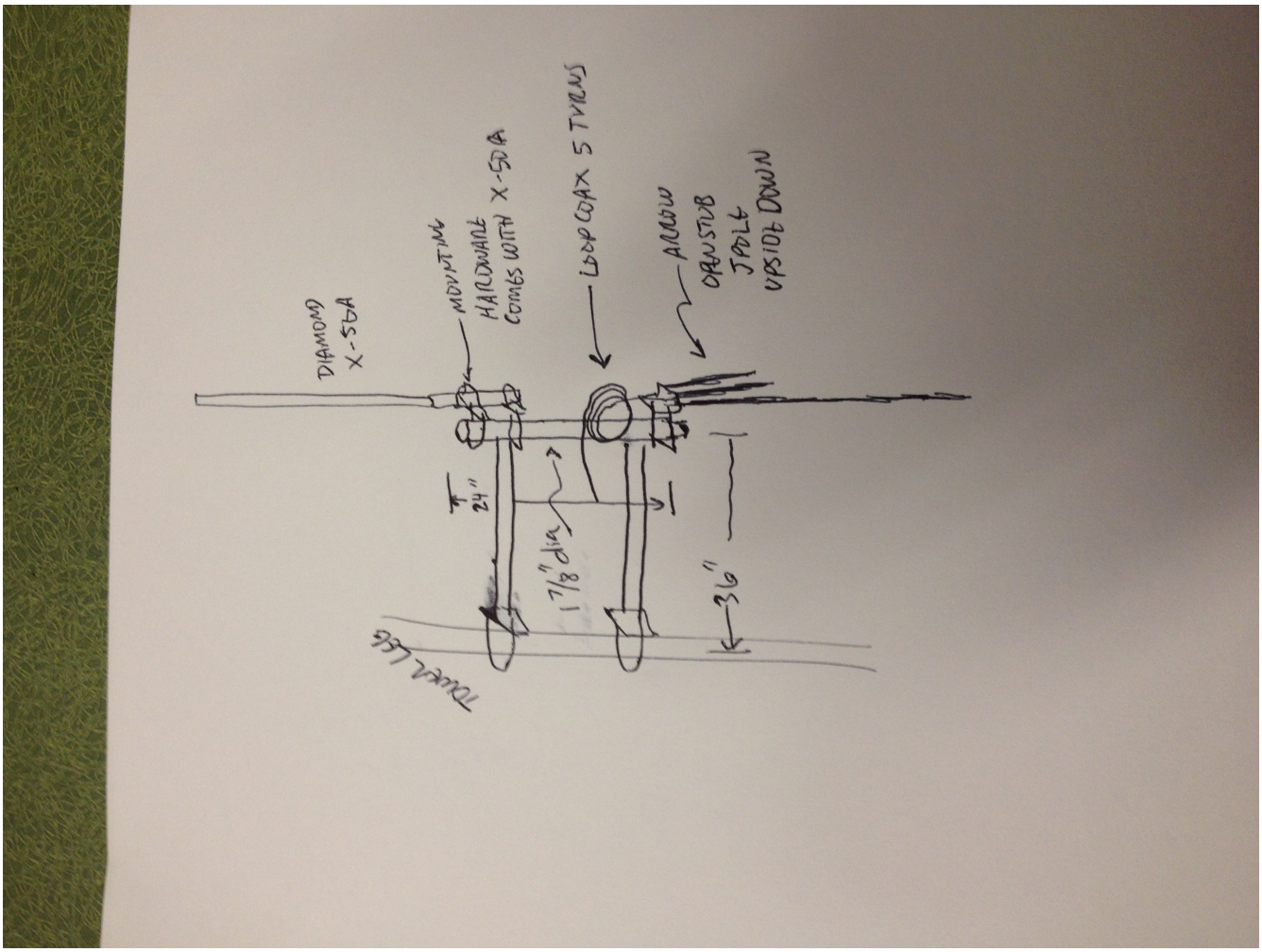
3. A sloping dipole, coming from a pulley 40-45 feet up your tower, with the other end tied off about 130 feet eastward on your building near the roofline (18 feet above ground). Minimizing visibility should be pretty easy. 14 gauge copper weld would be nearly invisible after a week in the weather, and we could use narrower 300-ohm balanced line instead of the wider 450 ohm balanced line from the middle part down to the tuner, so that would be difficult to make out also.

Again, I think those are equi-performance, so I believe your EOC would be equally served by any of them. I would suspect that #3 is cheapest since you have to climb the tower anyway for VHF antennas, but you might prefer others and they're all equal in my view.

Again, there are lots of options! I'm happy to sit and discuss any time, because all antennas are compromises. The reason we are NOT trying to get it super high (like 60-80 feet up) is that we're trying to give you connections to states in the Southeast and Ohio-to-Virginia level, rather than aiming for Hawaii. And this antenna would work equally well for VOICE and DIGITAL, and equally well on amateur bands as well as SHARES bands such as what the State EOC is proposing. We may need to add one or two "traps" wound on a 2" gray PVC coupler from Home Depot, to any of these, which does become more visible, but that depends on just exactly how the standing wave ratio curve works out and the Windom style I've suggested requires the least work in that regard. There is still a bit of "art" to this due to the unpredictable interactions with the building, lampposts, tower, etc. I have successfully used all three of these "style" antennas.

VHF EOC ANTENNAS:

email of 7/19/2017:



Hi, Ryan & the 2 Jeff's ---

I had promised to get you back information on suggestions for the VHF antennas at the 60 foot level on the tower. These are my best suggestions, assuming that the plan is to mount one antenna "up" and one antenna "down" on the same mount for maximum radio isolation. A hand-drawing is attached. As usual, if you have questions -- or a better idea! -- don't hesitate to bring it up!

1. TESSCO COMMSCOPE 3-foot standoff with 1-7/8" dia. 2-foot long antenna mounting pipe

https://www.tessco.com/products/displayProductInfo.do?sku=463911

2. UPPER ANTENNA: (mounted traditionally, upwards)
Diamond X-50A
$95 https://www.dxengineering.com/parts/dmn-x50a

Instructions: http://www.diamondantenna.net/pdfdocs/X50A%20Instructions.pdf
Mounts to mast from 1.2" - 2.4 " This should mount easily on the COMMSCOPE standoff. The feedline connection of this design is carefully protected from the weather, but we should still use dielectric grease liberally on it.

3. LOWER ANTENNA: (mounted downwards)
Open Stub 146/440 J pole: http://www.arrowantennas.com/osj/j-pole.html $49
This is a dual band antenna that is so simple that it can be mounted upside down. We have one right now on the top of Beatty Towers (I wanted to test this antenna). If there are other dual band antennas that can be mounted UPSIDE DOWN, then I'd be happy to switch to them; this was the only one I found that seems OK without water draining capabilities.

http://www.arrowantennas.com/inst/MBII.pdf -- instructions
As delivered, Handles up to a 1.5" mast -- but we need 1-7/8"
We will need to modify it's mounting holes a bit to match the 1-7/8" dia. Commscope standoff. From looking at the photos of the angle bracket, this shouldn't be too much of a problem. The angle bracket is aluminum and we can drill an additional hole a bit further out and adjust the bolt as needed to handle the 1-7/8" mounting pipe.

When we assemble it, we'll thoroughly fill the antenna feedline connection with dielectric grease. The PL259 fitting on the cable will also have to be carefully waterproofed, not sure if we want to solder the shield as well as crimp.

The open stub antenna does not like to have metal mast extending above its mounting area into its "antenna" area. If we are not satisfied with its clamping to the standoff, we may want to drill a hole through the antenna mounting pole cross wise and put a galvanized bolt through as a "pin". It will be easier to plan this once we have the parts in hand.

Loop feedline cable five times with a diameter of about 6" or so, secure, as a balun to reduce outside currents on the coax shield.