Planning Advisory Notice

Antenna Installations - Mounts and Configurations



72036 monopole with several co-locaters rigged for work adding additional loading on the top platform in excess of what it was originally planned for, but engineering was done to show the mount would support the additional intended loading.

All of today's antenna installations will require a mount of one type or another. The changing antenna configuration being employed in support of the LTE rollout and other advanced technology has changed the historic use of mounts. More RF applications include additional non-antenna equipment increasing the weight and wind loading. The overloading of new and existing antenna mounts has many in the industry concerned. While the majority of work occurring is co-location on existing structures, the concerns about the suitability of antenna mount exists when any change in the antenna loading occurs. In the past, the loading requirements from one operator to another were clear, basic, and similar. In today's climate, this is no longer the case.

Consumers are demanding innovation and this is forcing the operators to increase capacity, through the installation of new networks or adding new equipment to their existing networks. This modernization or migration from 2G/3G to 4G or LTE, and beyond, can significantly increase the weight and Effective Projected Area (EPA or windload) of the equipment. Although well-made mounts can help antennas maintain optimum performance, attention must be paid to the mount's overall loading capability, their physical condition, and their ability to support the intended loading in accordance with the TIA-222-G Standard and other standards that may locally apply. An improper design can cause structural failures which can negatively impact productivity, efficiency, image, expenses, revenue, security and personal safety.

We must be true students and understand the questions that must be asked and how to solve the myriad of problems that arise from these questions. There are a few details that must be considered at every site, and in this month's PAN we will focus on items 1-3:

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- 1. What is the mount's design capacity?
- 2. What is the loading being installed on the mount?
- 3. How are the mount's capacity and the installed load reviewed?
- 4. Quality existing or new. Are there signs to question abuse/misuse/wear?
- 5. What are AISC and TIA requirements?

When evaluating a mount, there are a few concepts beyond the mount's functional ability to support the antenna and other attached equipment that must be considered. How is the mount attached to the structure? Does the mount require tiebacks to support the new loading? How many tiebacks? Are the tiebacks attached to the tower properly? What are the separation and azimuth requirements? Has the new loading configuration been evaluated by an engineer or at the very least evaluated using published mount design capacities?

When evaluating the new loading, the engineer must understand how to interpret the mount manufacturer's supplied data. The good news is this does not have to be overcomplicated. Many operators have standard installation configurations and as such the loading will be uniform from one site to the next. A critical step is to select the proper engineering resources to ensure that the specified mounts will meet the desired loading requirements in accord with the applicable standards. At times this presentation can be confusing. Often the capacity tables are defined at a height that does not correspond with the installation under review. Or, the Grambling 2 tower close up of some of the additional loading weight and wind load.



Mtg. Height (ft.)	Basic Wind Speed (mph)								
	75	80	85	90	95	100	105	110	115
50	98.9	87.3	77.7	69.4	61.8	55.8	50.6	46.2	42.3
100	84.5	75.0	66.6	59.4	53.0	48.2	43.9	39.5	36.3
150	78.5	69.0	61.0	54.6	49.0	43.9	40.3	36.7	33.5
200	73.8	65.4	57.4	51.0	46.2	41.9	37.9	34.3	31.1
250	71.0	62.2	54.6	49.0	43.9	39.5	36.3	33.1	30.3
300	68.2	59.8	53.0	47.0	42.3	38.3	34.7	31.5	29.1
350	66.2	57.8	51.0	45.8	41.1	36.7	33.5	30.7	27.9
400	63.8	55.8	49.8	44.7	39.5	35.9	32.3	29.9	27.1
450	62.6	54.6	48.6	43.1	39.1	35.1	31.9	29.1	26.3

Maximum (EPA), Per Pipe Mount, CaAa (sq. ft.)

table publishes capacities that do not match the installed configuration, (i.e. the published weight is too low or not listed when compared to the new technology configurations). If the published data does not match the configuration under review, the operator should consult an engineer or the mount manufacturer to confirm the mount will support the installed configuration. An example of a load table is shown below. Please note that the weight of the antenna and supporting equipment has not been



factored into the presentation. Therefore, evaluation of the mount using this table without consideration of the installed weight would be incorrect.

So, what do you do with the data? For any install it is critical to review the Construction Drawing (CD's) and determine if listed equipment and mounts match the equipment supplied. In the event that there is a discrepancy the engineer must be notified. It must be understood that the engineer cannot help if we do not inform them of a discrepancy with the CD's, and in many cases it is necessary to request this clarification in writing.

In the event that the mounting option is left open, the manufacturer chosen must provide the necessary documentation to ensure that the supplied mounts will meet the loading requirements in accordance with the standards. Properly available data or a review by an engineer will confirm that the mount is properly selected. Similarly, existing mounts should be reviewed to confirm the loading change will continue to be in accordance with the TIA Standard. In both situations, the TIA Standards requires mounts to meet the same structural requirement used to evaluate the tower. The design requirements are very clear. If published data is properly presented, the new antenna equipment "Effective Projected Area" and weight can be compared to the published data to confirm the mount is acceptable.

When upgrading an existing structure, do not assume the mount has been evaluated. Most structural

reanalysis effort does not include the evaluation of the mounts. The review of the mount is often excluded from the scope of the structures reanalysis. The mount must and should be reviewed when the antenna equipment loading changes. All mounts must be evaluated in accordance with TIA-222-G. And based upon each states regulations, the engineering must be completed by a professional engineer. As noted above, the mount evaluation for a particular antenna equipment configuration can be completed once for a large number of sites. The equipment variation, attachment height and wind loading are not significant from site to site allowing a general review to occur.

In the next Planning Advisory Notice (PAN), we will review the inspection of mounts, man loads, and manufacturing quality. We will also delve into the practices that should be employed to safeguard mounts and climbing personnel.