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Thinking outside the sphere

Observations on the SBA Application for a Special Permit to Install a Wireless Facility and Tower at 5 Craig Road, Acton, Massachusetts

September 13, 2013

The Acton Planning Board is hearing an application by SBA Towers II, LLC to install a 170 foot tower and accompanying wireless facilities at 5 Craig Road. Following is a bulleted listing of our observations:

3.10.5.2- A Monopole Tower is allowed by right in this district if it is no greater than the district height limit of 40 feet and it meets certain setbacks.

3.10.6.3- The tower height is proposed to be 110 feet. The bylaw specification is for a 175 foot maximum[1], based on the greater ("higher") of two measurements. One is from the point of the base of the proposed tower and the other is from the average elevation of the land within 500 feet of the tower. The proposed 110-foot height is based on the former measurement (elevation at the point of the tower base). No average elevation is presented. It is reassuring that the terrain is relatively flat around the proposed tower site and the proposed tower height is 65 feet less than the maximum, indicating a likelihood that the proposed tower satisfies 175 foot height limit under the dual-height-measurement criterion.

3.10.6.4-

- The proposed tower is not a CAM and may require a Board determination that the "aesthetic considerations are less important" for the proposed facility, enabling a non-CAM design. The applicant does not explain why it believes the proposal "complies with this provision of the Bylaw" in the Tab 1 narrative of the application (p. 6).
- A 110-foot "monopine" tower is likely to be able to support 3 or 4 wireless antenna systems at 10-foot intervals on the tower, as long as it is structurally designed to do so. If the appearance of the proposed tower as a monopine is substantially more objectionable than a CAM design, then a CAM design is still open for consideration. Wireless carriers are

[1] If the FAA limit for maintaining a tower without lights is less than 175 feet, then the maximum height is reduced to below the FAA lighting threshold. Applicant has provided evidence that the FAA will permit a tower up to 115 ft above ground level without lighting. There is no evidence on the record regarding any greater potential height.

cramming more equipment on their towers than ever before, resulting in pressure to avoid CAM designs or to occupy greater vertical space in the CAM to achieve the desired result. For example, as carriers obtain licenses for more bands in the wireless spectrum the antenna configurations and dimensions may change. Further, to improve coverage and capacity of a facility, carriers are more frequently adding electronics boxes to the antenna installations. These boxes, often called Remote Radio Heads ("RRH"), are about 1-2 cubic feet volume and are often mounted behind or below the antenna. More than one box may be necessary for each of the three sectors of the facility's coverage. (A sector is typically a 120-degree horizontal swath of the area to be served.)

- The visual impact of a CAM in comparison to the proposed monopine can be compared if the applicant were to provide a supplement to its photosimulations to show a CAM. It is worth noting that one of the complaints about monopines is that they are often built to a size that is not consistent with New England conifer heights. At 110 feet, the proposed monopine design is consistent with the heights of taller pine trees found in the region (although the context of the location also bears consideration).

3.10.6.5 –

- The proposed 110 foot height is substantially below the maximum height allowed under 3.10.6.3 (175 feet). This section requires the structure to be constructed in a way that it would be extendable to the 175 foot height (reading literally). As a practical matter, if the 110 foot height is sufficient (or more than sufficient) for the present applicant (AT&T), then it stands to reason that any imaginable tower extension to serve all carriers need only be an additional 10 to 30 feet, if any at all. Allowing for the fact that just because a tower is extendable, the Board need not approve such an extension in the future, it may be prudent to limit the extendibility of the proposed tower to either no extendibility, for critical visual impact reasons, or to some lesser height than the 175 feet that is palatable to the community.
- Under 3.10.6.15 the Board has discretion to limit the number of towers on a site. While it may not be necessary to make a determination in the present matter, leaving it for a future Board to consider if and when the time comes, there might be an advantage to the prospect of two shorter towers being developed over time, versus one taller tower. This possibility could be considered when deciding the extent to which the proposed tower should or should not be constructed to be extendible.
- This may be a suitable place to mention the 2012 Middle Class Tax Relief and Jobs Creation Act (Section 6409). This law requires municipalities to approve modifications to "eligible facilities." We will not go through all the details here. Specifically, any facility that is approved today or already in place may be modified in the future in ways that "does not

substantially change the physical dimensions" of the tower or base station in the eyes of the federal government and the courts. Since this law is quite new, the meaning of "substantially change" is not well threshed out. It would be prudent to anticipate the range of modifications that the Town might be required to allow in the future when crafting any approval of the proposed facility today.

3.10.6.9 a) – The proposed monopine design maximizes the use of vertical space ("minimize vertical space consumption") by employing full-frame antenna mounts in ten-foot apertures. If a CAM design is required, then efforts can be made to minimize vertical space consumption. For instance, using the ten-foot-aperture convention, carriers often say they need two apertures in a CAM to satisfy their needs. With more careful analysis, it may be that either one aperture is sufficient with design tradeoffs, or that 1.3 to 1.5 apertures (13 to 15 feet) may be sufficient to satisfy the design needs. If the CAM is under serious consideration by the Board, the applicant should provide a detailed antenna installation design that minimizes the vertical space requirement of the design.

b) c) & f) – Applicant is a tower company in whose interest it is to maximize co-location (to the extent a tenant is not fatally offended) and to make efficient use of its equipment compound. The 30x90 foot compound is typical in square footage for such spaces and should be adequate to address the needs of the several carriers who might utilize the tower.
d) – (Board entitlement to include conditions that require permit holder to relocate to another site to maximize co-location, and remove tower). In the context of this facility and its surroundings, it seems unlikely that such a scenario would occur. If approved and constructed, this facility would offer co-location potential to other carriers. The Board could consider whether imposing a condition of this nature would be a way to enable the removal of the tower if a less impactful tower were developed nearby in the future.

3.10.6.12 – In a previous hearing on a proposal at the same site, the Board made a distinction between Personal Wireless Services as they relate to wireless telephony, on the one hand, and broadband data services that provide no telephony, on the other. The Board might consider whether it is necessary or prudent to add a condition stating to the effect that as long as a provider is providing personal wireless services from the facility, that same provider may provide related services from the same facility, so long as the installation does not exceed the approved design of the facility.

3.10.6.14 – Regarding conditioning permits on Carrier provision of reports on request, the applicant is not a Carrier of personal wireless services, so interpretation of this clause may be

necessary. Although it has rarely, if ever, been necessary to confirm a wireless tower's compliance, years after construction, with noise, radio frequency or aeronautical criteria, it would not be harmful to impose a criterion based on reasonable concerns of an issue. We do not support automatic scheduled reporting, the administrative burden of which outweighs the benefits in this case.

3.10.6.17 – Several Mandatory Findings: Minimizing adverse impacts, most community compatible method, evidence of significant gap, no existing wireless facilities can help, no less objectionable sites. We rely on local knowledge to suggest alternative locations that are in the vicinity of the targeted area that might be more compatible.

- The facility is described by the applicant as needed to provide "seamless coverage" (Tab 1, p. 1). As wireless carriers expand their networks to provide robust data services, the concept of "seamless coverage" loses its meaning. Seamless coverage relates to the ability for a mobile user to maintain a call while in motion among two or more cell sites. In data communications terms, data can generally be buffered for moderate periods of time to accommodate brief interruptions in connectivity performance (and capacity availability). Carriers are seeking to provide more robust service into residences and workplaces to satisfy the demand for indoor data communications (and voice communications will benefit as well).
- The Site Acquisition Agent (Tab 7) explains that he is informed by AT&T, "4. In this instance, the area within which AT&T is experiencing a significant gap in reliable network coverage is centered along Route 2, near the intersection of Craig Road and School Street within the Town of Acton, Massachusetts, and has a radius of approximately .45 miles..." and "7. The geographic area defined by AT&T's radio frequency experts consists of an area centered south of the intersection of Route 2 and School Street."
- Primary applicant SBA is not a wireless service provider and relies on prospective tenant AT&T to show whether there is a gap in service. AT&T provided two computer-estimated coverage maps (Tab 4) – one showing projected existing coverage ("Existing Coverage Map") and one showing projected existing-plus-proposed coverage ("Proposed Coverage"). Our initial impressions are:
    - It is not indicated whether the maps show coverage of 850 MHz Cellular, 1950 MHz PCS (or AWS), or 700 MHz service.
    - Existing coverage from the Annursnac Hill facility in Concord (MAU3403) appears to be remarkably dismal considering the significant advantage over the local terrain that the hilltop offers. Our first-approximation analysis on our computer suggests there is more coverage in the direction of the proposed facility than the map shows. We suggest that AT&T look for a possible data entry error in the setups of this site

on their computer. If this issue is not singly resolved by an AT&T review of its work, then we would recommend that all the facility characteristics be provided to us for each relevant facility so that we may produce our own versions of the coverage analysis for publication in the record. In addition, if the discrepancy between our assessment and AT&T's is determined to be material to the decisionmaking process, it may be prudent to conduct a drive test of existing coverage before the foliage drops to compare to the computer models.

- Existing coverage from the Great Hill facility (MAU3031) also appears to be remarkably limited, considering the commanding elevation of that facility. This further reinforces the benefit of obtaining more specific information about the facilities' characteristics for us to model, and for AT&T to verify the accuracy of their data entry in their computer.
- The Site Acquisition Agent testifies that AT&T has a "significant gap" in a radius of "about .45 miles" centered south of RT 2 on School Street, near Craig Road.
- Counterintuitively, the middle of the purported gap has a higher existing signal level (according to the AT&T map) than its surroundings. See the circle we placed on the map segment below.
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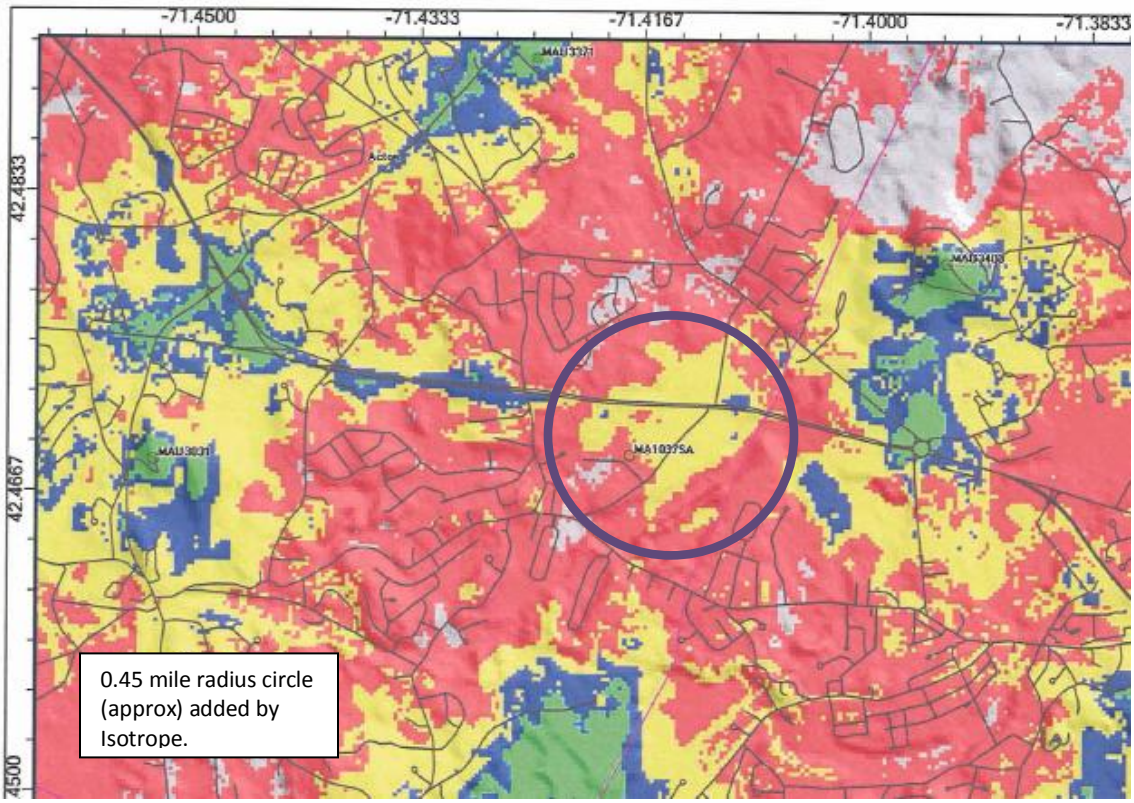
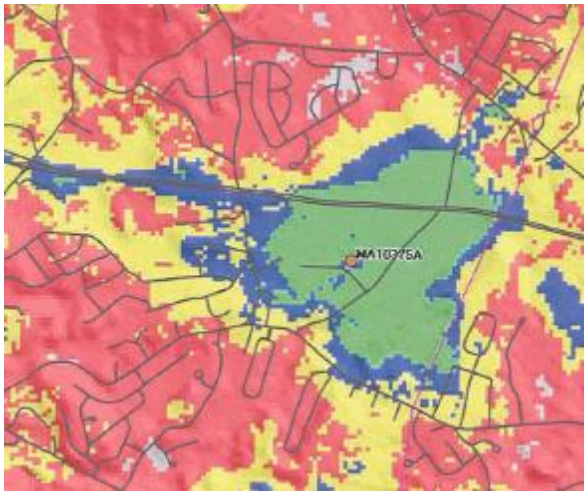


This is the 0.45 mile radius described by the applicant. Note how it encircles the yellow area of coverage, which is a stronger signal level class than the surrounding orange/red areas. (Note that while we rely on this map for this discussion, we do not abandon our concern, above, that there are other flaws in the coverage depicted.)

- If the goal is in-vehicle coverage particularly on Route 2, then the in-building service level (this is typically what the green represents) is not necessary for this purpose. If the goal is to improve the penetration of wireless coverage into developed areas, the mass of green and blue proposed coverage over the undevelopable fields and Route 2 corridor is also wasted (proposed coverage shown below). Developed areas seem to derive little benefit from the proposed facility, considering where the green and blue color areas land.



- The placement of the proposed facility at the location which is set back from but near Route 2, and adjacent to a substantial amount of undeveloped open space, forces the facility to deliver a substantial amount of in-building service to areas where it is of no use. It is typically more effective to have wireless facilities that are intended to provide in-building service to be placed where the in-building coverage does the most good. This has to be balanced with the zoning objectives of avoiding objectionable consequences of facilities inaptly placed in residential or commercial areas.

3.10.6.17 e) (Alternatives)

- We note that to the west of Hosmer Road and south of Route 2, there is some commercial/industrial development and a more substantial presence of tree growth

surrounding the area that might better mitigate the visual impacts of a new tower. While this location is northwest of the proposed site, it might satisfy the coverage objectives while potentially being more in keeping with the objectives of the bylaw. It also appears that it could provide desirable in-building coverage to more buildings than from the proposed site.

- Even with the development of the proposed facility, AT&T's data suggests there will remain significant voids in the coverage in residential areas of Acton. AT&T (or other carriers) may be back in the not-too-distant future to develop new sites. It may be helpful to consider that prospect in conjunction with considering the proposed facility for possible benefits or unintended consequences of locking in an AT&T facility at this site.

3.10.6.17 j) – The proposed facility has been demonstrated to be compliant with FAA and MAC aeronautical criteria without requiring tower lighting and marking. It is compliant with FCC radio emissions criteria as demonstrated by the analysis provided by the applicant. Noise is unlikely to be an issue because the site is industrial in nature and remote from residences; these facilities also generate noise primarily with cooling fans and air conditioning, not unlike that which is found service other commercial/industrial facilities. The applicant could be questioned about present or future plans for a generator, although the noise from a generator is also not likely to be an issue.

In summary, we have identified the following questions and discrepancies:

- Documentation confirming or rejecting the possibility of using a shorter tower that could be increased in height in the future if proven necessary to the Board.
- Consider allowing one or more shorter towers on the site, if and when necessary, if the resulting lesser tower heights provide a substantial reduction in objectionable visual impact.
- Documentation of any technical reasons (including RF engineering calculations or other data if applicable) for requiring changes to the 10-foot spacing or to the number of carriers able to use the tower if a CAM is required instead of the proposed platform arrays in a monopine.
- If a monopine is approved, consider imposing a condition that ensures the foliage is dense enough to obscure view of the antennas and hardware, that the antennas and hardware are painted to match, and that the foliage is fully maintained throughout the life of the structure.

- Coverage analysis needs additional information: Possible flaws in existing coverage analysis; if Isotrope second-opinion plots are desired, obtain the necessary data from AT&T; obtain analysis of coverage from lesser height (e.g. 80 feet) and a rationale as to why this or any lesser height is insufficient for AT&T.
- Identify likely prospects for alternatives and obtain coverage analysis and due diligence effort documentation, if not already on the record. Include not only one-for-one alternatives to substitute for the proposal, but also other approaches that in a master planning context would lay the groundwork for future improvements to coverage in Acton in an orderly progression of multiple facilities.
- Evaluate (coverage, availability, visual impact, zoning compliance) potential of alternative facility at the office park area west of Hosmer Rd and south of Rt 2 (also, is the wooded area east of Hosmer Rd and south of Rt 2 available?)
- If an average elevation within 500 feet is required for the record (tower height determination), obtain from applicant.

We look forward to discussing the Board's questions and issues at the upcoming hearing.

David Maxson, WCP
Isotrope, LLC
503 Main Street
Medfield, MA 02052
508 359 8833