International Special Review District Board meeting request letter

Applicant:	T-Mobile
Applicant's Agent:	Technology Associates EC INC, Chris DeVoist 9725 3rd Ave NE, Suite 410, Seattle, WA 98115 206-949-3321 christopher.devoist@taec.net
Submitted To:	International Special Review District Board
Date:	June 16, 2022
Project Name:	T-Mobile SE03494E Weller King/Fujisada Condos
Project Address:	510 6TH AVE S
Parcel Number:	2662650000
SDCI Project Numbers:	000655-22PA (Pre-App), DONH-COA-00470 (DONH COA), 3039261-LU (MUP), 6883695-CN (Const.)
Application Type:	International Special Review District Board

Dear members of the International Special Review District Board,

As part of the required approvals for this new wireless facility proposed by T-Mobile, we applied for a Department of Neighborhoods Certificate of Approval that would need to be obtained prior to our application for our master use permit.

I received corrections to my application from Rebecca Frestedt and proceeded to revise the proposal to be compliant.

We were able to address all of Rebecca's comments to her satisfaction in order to approve our proposal administratively save for one item.

It was requested that we propose an alternative location that would move everything to the center of the roof in accordance with SMC 23.57.014.B.1. We attempted to re-design the facility to be in compliance, but it is not feasible.

We attempted to change the design to confirm with the City's the preference for all the antennas and equipment to be consolidated towards the center of the roof, however, after we modeled locating the antennas on the lower roof and not on the penthouse, and it was determined that our RF coverage objectives could not be met from that location.

We assessed an alternative location off the stairwell penthouse, slightly East of the center of the building. The true center of the rooftop is filled with HVAC equipment, and steel ductwork that will significantly impact the RF signals as well as vents and other existing features that we can't interfere with. In this alternative location, we pushed the facility to the center of the building north-south wise, and as far west as the existing HVAC ducts would allow without causing additional issues, and this ended up slightly East of center.

At this new location just east of the center of the building rooftop, the sector at 140° that is to provide additional coverage to the international district down to the immediate Southeast is blocked. That coverage can be achieved from the top of the penthouse very well, however, if we move towards the center of the roof, that very penthouse will now significantly block that sector from achieving its RF coverage objectives as a large portion of the antenna's signals will not be able to pass the penthouse and will cause interference issues or completely block the signal. There is no area of consolidation toward the center of the rooftop where this coverage can be achieved, and it must be located on top of the penthouse to work.

For this reason, we are requesting that this preference be waived so that we can accomplish our coverage objectives. Please see attached "Radio Frequency Engineering Analysis Regarding Antenna Placement" for additional information.

The above is the reason we are requesting to be allowed to locate on the penthouse as it is the only way to properly serve the customers down to the immediate southeast of the building. However, secondarily, while we were analyzing the RF impacts of relocating toward the center of the rooftop, we also presented a revised design showing the center mounted shroud to the president of the condo board who in turn presented to the condo board and the board is strongly opposed to a center mounted antenna shroud and made it very clear that they will not approve this change and will walk away from the project at that point.

We are asking to be allowed on the penthouse for RF engineering reasons. But we are also stating that even if a design solution was possible to solve the RF engineering issues, which it is not, we would still be forced by the property owners to cancel the project and start over at a new location. The current location is the 5th candidate that has been attempted in this several block search area over the course of several years so there really aren't any alternatives left to achieve this coverage and improve the service to that area of the international district. We hope that we can work together to achieve our RF coverage objectives, satisfy the requirements of the building ownership, and still do our best to satisfy the City's requirements and preferences as well as we can.

Aside from the above request, the proposed shroud is designed to be a natural architectural extension of the existing stairwell penthouse that will match it in color and material finish and will blend in naturally. The proposal will be compliant to all other applicable codes as will be demonstrated in Master Use Permit application narrative (available upon request).

Plans, Photographic Simulations, and Samples of material and color specification have been provided in the Certificate of Approval submittal and are provided here as well.

This request however is specifically to ask the International Special Review District Board to approval to locate the new antenna shroud on top of the stairwell penthouse instead of towards the center of the roof.

Please see attached Radio Frequency Engineering Analysis Regarding Antenna Placement for additional information on the infeasibility of located towards the center of the roof.

Please contact me with any questions or requests.

Sincerely,

Chris DeVoist - christopher.devoist@taec.net | 206-949-3321

June 1, 2022

City of Seattle
700 – Fifth Ave.
Seattle, WA 98104

RE: **510 6th Ave, Seattle, WA**
T-Mobile: SE03494E Weller King-Fujisada
Radio Frequency Engineering Analysis Regarding Antenna Placement

Dear City of Seattle,

I am an RF engineer employed by T-Mobile and I am engineer responsible for the deployment at SE03494E Weller King-Fujisada along 6th Ave S and S Weller St. This letter is to provide additional information and clarity regarding the antenna placement required on the roof of this building.

The general rule is the for every 3 feet antenna is moved from the edge of the roof, it must be 1-foot above the roof. The ratio is required because the roof itself can act as an obstruction to the RF signal. If the antenna is located on the roof and it is not high enough above the roof depending on the location, then the signal will bounce off the roof and cause a disruption to the coverage. The same can be said of rooftop parapets and penthouses, as antennas must be located high enough above a roof to clear a parapet or penthouse wall which will act as an obstruction to the signal.

We have reviewed the comments from the City of Seattle and attempted to revise the design as follows:

Single Enclosure Design: The proposed enclose is planned to be mounted on the top of the penthouse.

The antenna azimuths in this enclosure are 15 degrees, 140 degrees, and 300 degrees. The antenna proposed to be utilized for this installation is an eight-foot antenna.

We have taken into consideration the central roof mounted design favored by the City of Seattle, however there are issues that will render that design ineffective. In terms of design there is a major issue present, the penthouse. The penthouse will become an obstruction. For our design, the antenna directions that present issues are at 140 degrees.

- **Antenna Direction at 140 Degrees**:

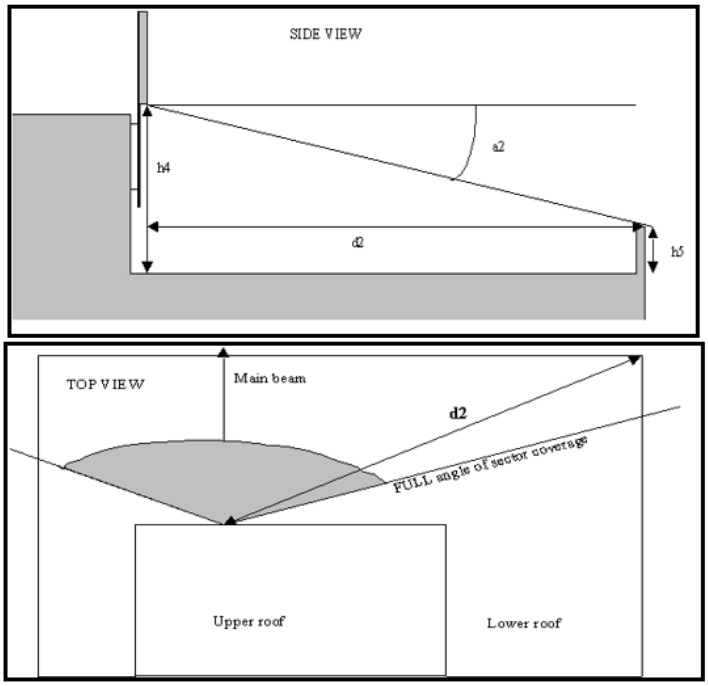
  The antenna azimuth proposed is 140 degrees, so the antennas point to the southeast. The enclosure is proposed to be located at the edge of the building at the top of the penthouse. Ensuring that there are not any signal obstructions.

  If we are to mount the antenna at the center of the building, we need to evaluate that design using our tools. The proposed antenna is eight feet in height and the setback from the building penthouse requires the base of the antennas to be approximately eighteen feet above the roof

surface for a total overall height of 26’ above the roof or 106’-1” AGL which is not allowable by code or feasible therefore that design is not possible. Since that design is not possible, we need to look at an alternative to eliminate signal blockage issue. We need to relocate from the favored location to the penthouse top.

Exhibit 1 below illustrates the equation of the height required above the roof to clear the penthouse as an obstruction:

Exhibit 1



Antenna Roof Clearance Calculation

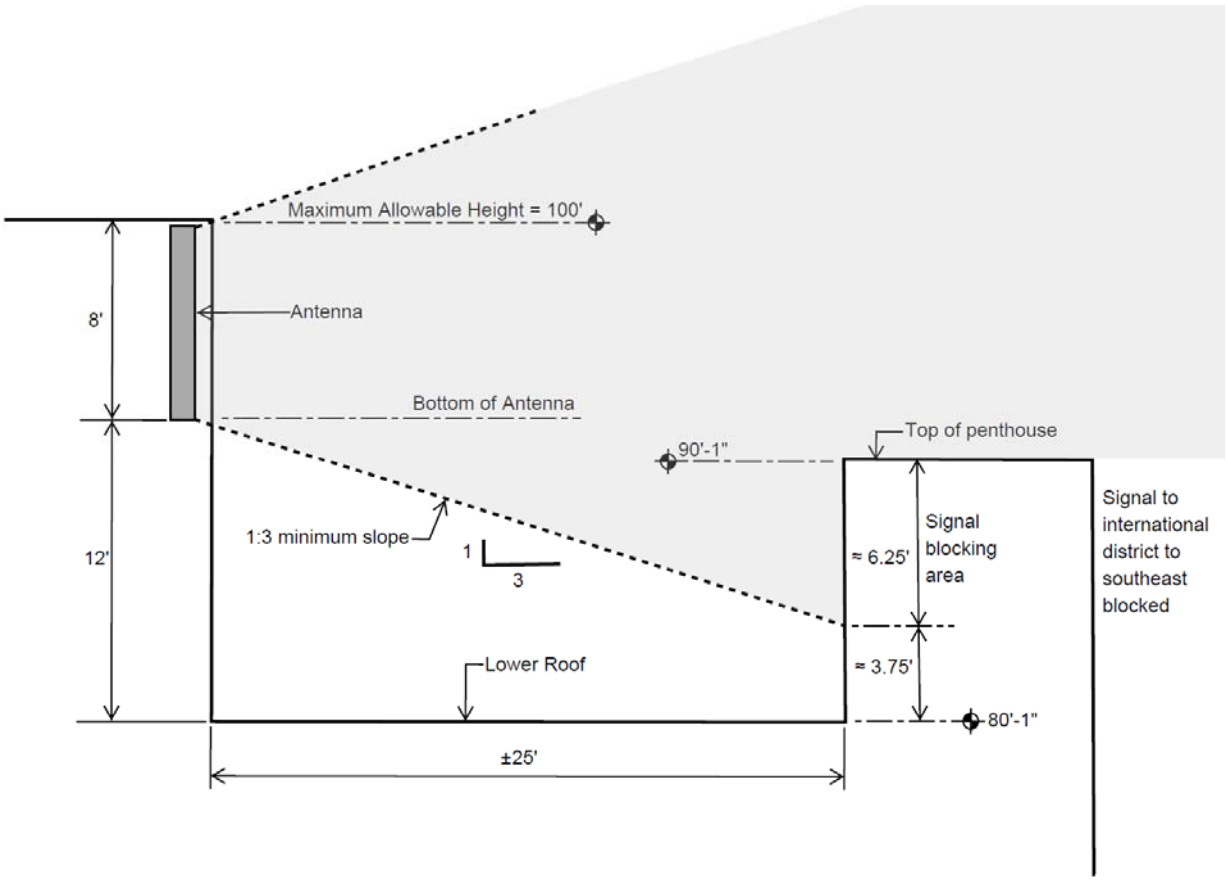
1) Locate the furthest point on the roof within the sector coverage angle		
2) Note the distance to this point (ft)	25	(d2)
3) What is the height of the obstruction e.g. parapet if applicable. (ft)	10	(h5)
4) What is the required downtilt in degrees (see DOWNTILT sheet)	9	
5) What is the vertical 3 dB beamwidth of the antenna in degrees	10.2	
6) Required clearance angle is the sum of downtilt + half the antenna vertical beamwidth plus 3 degrees to allow additional downtilt in the future if necessary	17.1	(a2)
7) For sufficient clearance, base of antenna should be this high above the main roof level	17.7	(h4)

This is illustrative of the calculation that is required and does not demonstrate the actual calculation at this site.

The calculation takes into account the antenna to be utilized which in this case has a 10.2 vertical beamwidth (the largest vertical beamwidth of all proposed site antennas) and with a ten foot penthouse height above roof surface and a twenty-five foot setback from the penthouse, along with a nine degree of total downtilt, the requirement is for an antenna that is eighteen (18) feet above the roof (base height) or a twenty six foot tip height at a minimum which would be 106’-1” AGL which is neither allowable by code nor is it feasible. Based upon the calculations, the proposed relocation to the penthouse will eliminate any blockage that will occur so that the antenna can be fully utilized to provide coverage and capacity to the International District.

Exhibit 2 below shows a visualization of how the penthouse obstruction will block the signal.

Exhibit 2



Please let me know if you have any questions.

T-Mobile USA, Inc.

Victor Bayouk

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Victor Bayouk
Radio Frequency Engineer