



G. M. SELBY, Inc.

May 23, 2019

Andria Wingett
Assistant Director
Development Services
2600 Hollywood Blvd., Room 422
Hollywood, FL 33022

RE: Site Evaluation for P25 Tower

Dear Ms. Wingett:

Following the Broward County Commission's Meetings and the meetings at the City offices, we have put together a list of items requiring an explanation to ensure that the unbiased engineering and radio frequency/coverage issues are addressed for the City of Hollywood.

Plans Submitted

The plans we received which were submitted for permitting are incomplete. They need to show at a minimum the following:

1. Site plan – OK
2. Plan view with details – only partial details provided
3. Calculations for ASCE Chapter 7 wind loading for High Hazard Zones
4. Elevation views of Equipment shelter, generator and cable trays/runs to the tower
5. Engineering drawings of the tower itself to ensure adequate strength and attachments including safety equipment and lights
6. Foundation drawings showing adequacy of support
7. Drainage slopes
8. Mechanical drawings
9. Electrical - conductors for lightning strikes
10. Electrical - Ground ring around the site with backup resistance information

Wave runup and storm surges are a major issue in South Florida. During Hurricane Irma the storm surges were between 3 to 6 feet elevation. This

site sits at an elevation of 1.9 to 2.1 feet. King tides will be able to cause inundation at this site if not improved. During a storm event the undermining of the foundation will be prevalent and a potential threat of tower failure. As such the foundations will need to be three large caisson type foundations augured to a depth of 60 to 80 feet deep. Calculations need to accompany all drawings to show adequacy of bearing resistance and overturning moment.

Foundation and Anchors (i) Foundations for tower and mast structures shall be designed to withstand the full expected dynamic loads namely; antennae, feeders, wind loading, etc. (ii) The design shall take cognizance of the geo-technical investigation findings on soil and wind conditions at the installation site for purposes of determining bearing pressures (vertical and horizontal), other sub-surface conditions, the suitable foundation type (reinforced concrete blocks, standard pad and column, raft, preset rock anchors or piles), construction materials and installation method. (iii) Engineers are to compute the weight of tower structure, antenna feeders and all associated steel work and then, calculate the effect of wind loads on the total surface. (iv) Worst case load design condition should always constitute the initial factor of safety against overturning for complete foundations or any part thereof. (v) Standard foundation designs should be made for normal soils where however the need arises; it may be modified to suit the soil conditions at the installation site.

All communications structures must be designed to the ANSI/TIA-222-G standard

Statement	Reality
The tower placed on the ground will be much more stable than the tower placed on the roof of the CIRC hotel. Commissioner Dr. Barbara Shareif (District 8)	Incorrect. The County is not installing a tower on top of the CIRC hotel. The only equipment to be installed on top of the CIRC rooftop are the antennas. In the case of the Broward County Public Safety P25 network, there will be six (6) antennas placed on the roof and 2 microwave dishes. The P25 Base Station will be installed in a room below the level of the antennas, and the power system, battery strings and generator will be installed on a lower level of the building. (parking garage) The installation on the CIRC hotel in truth affords much greater protection to the P25 infrastructure than a tower regardless of where the tower is located.
The tower engineered by KCI will not fall like a tree. It will collapse down upon itself. KCI Consultant in response Commissioner Lamar Fisher	Incorrect. This is not guaranteed nor can it be guaranteed to the County, City or residents. How a tower comes down is affected by multiple factors (e.g. foundation design, loading on the tower, intensity of uplift associated with a storm etc.). How the tower will come down is truly unknown. Towers come down at their weakest point be that the anchor bolts, at a location up the tower or the tower simply tipping over and the foundation coming right along with it if the foundation was incorrectly engineered. This is why detailed structural information is required and a break – point analysis be performed. (we do that on a regular basis)
Antennas on a rooftop, if torn off, would be projectiles, but not West Lake Tower. KCI Consultant in response Commissioner Lamar Fisher	Incorrect. First, any item torn off of a tower, rooftop, building, etc. immediately becomes a projectile. Regardless of whether the materials are on a tower or a rooftop, the moment they are sheared off the tower, they become a projectile. Both the West Lake Tower site and the CIRC hotel are surrounded by residential area. In addition, there are other telco towers and rooftop sites in the area. There is no difference in safety between the West Lake Park tower and the CIRC hotel as it relates to antennas becoming projectiles in the event of becoming separated from the antenna pipe or mount. The antennas and other appurtenances on towers are designed to break away during a hurricane to ensure the tower itself does not come down, as if not, they act as a sail causing undue load on the tower which may lead to

	catastrophic failure.
The shelter design is 10' above sea level and therefore should be protected against storm surge. In addition, if the equipment does get affected by water, the County of Broward can bring in a mobile unit (e.g. Cell Site on Wheels) to recover the site. KCI Consultant in response Commissioner Lamar Fisher	Incorrect. The drawings submitted show the shelter installed at 2'1" above sea level, and shelter is situated on a normal concrete pad. A 2 to 3' storm surge will begin posing a risk to the P25 equipment. Storm surges (depending on the size of the storm) and king tides could very easily reach 3 to 6 ft or more. In addition, it is common knowledge that large storm surges may remain for days after a storm passes. The West Lake Park site is 2'1" above sea level with only one road into the site (822). The equipment installed on a Cell Site on Wheels is typically 12" to 18" above the ground. A Cell Site on Wheels for a site 2'1" above sea level is not a viable solution for recovering the P25 network after a storm.
The documentation from KCI shows that with the CIRC site residents will be in "Blackout" areas and could be unable to receive 911 service. Commissioner Steve Geller (District 5)	Incorrect. The statement is referring to "shadowing" and shadowing is very common to any and all RF technologies. Shadowing refers to large structures that block or weaken the signal due to the fact that the building is in between where the user may be located and where the tower is located. Shadowing does not mean there is a complete and total blackout of service as stated during the meeting. It means that the signal may not be entirely as strong (e.g. 4 bars of service rather than 5 bars). In situations where this occurs, there are solutions for overcoming it if the shadowing is significant such as repeaters, additional base stations, etc. In the case of both the CIRC hotel and the West Lake Park site, minimal shadowing will occur; however, the impact of shadowing is minimal. In particular given the high-power amplifiers utilized on the P25 base stations.
The CIRC hotel was not constructed for co-location.	Incorrect. The owners of the CIRC hotel originated from South Africa, and every hotel they have ever owned had co-location tenants on the roof. The CIRC hotel was

	engineered and built assuming co-location would occur, and discussions are currently ongoing with carriers (e.g. Verizon, ATT, etc.) to place antennas up on the roof. The only thing that is factual about the statement is that the upper floor was not engineered to have the battery strings located there. In truth, no carrier would place their batteries up on the roof due to the weight of the batteries. The power plant and generator would be located on a lower floor. The issue is not with the CIRC hotel structural engineering. It is with the implementation strategy proposed by KCI, Mission Critical Partners and Motorola. But in the event the roof needed to house equipment – a design could be made to accommodate such without causing structural problem to the CIRC building.
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RF analysis performed for the CIRC site showed that the antennas can be placed behind the parapet wall without impeding on the signal and not adding to any shadowing effects at all.

Coverage from either the West Lake site or the CIRC hotel is comparable.

RF assumptions made include:

- PA = 100 W
- Feeder losses: 3 dBs (assumed 1-5/8" 300' feeder run, as I preferred to be on the conservative side)
- + Antenna Gain (as specified in the BTS antenna specs)
- BTS Sensitivity: -122 dB
- Mobile Tx Pwr: 3 Watts

Other Observations

- The original drawings appeared to have the site located in a field within the park.
- The engineering documentation states very clearly that this shelter is not designed for a flood zone. By looking at where the site is to be located, and its close proximity to the ocean, it is in a flood zone without a question.

- In reviewing the foundation designs for WLP, and given its location, it will require to have borings of 60' to 80' and secure the tower foundations directly to the bed rock.
- Should this location be used, the ensuing borings will yield a very large quantity by volume of soil and water which will need to be disposed off away from the site. Otherwise local disposal will yield contamination to the groundwater and coastal wetlands. Three 80' borings that are at least 6 to 7' wide is A LOT of earth to take out of the ground, and they cannot just dump all that in the surrounding area.
- None of the drawings show how the equipment is going to get installed. What is the P25 BTS and what is the DC power and battery backup in the line up? No detailed explanation of what is inside the shelter has been provided, as such we cannot quantify the space requirements.
- Drawings show where the generator is to be installed; however, no reference to where the fuel tank would be located. The fuel tank is the biggest hazard in the event of a storm. A large capacity tank will be required to power the generator and keep the site online until such time that the electricity is restored.
- If the correct location for the tower was given, an access road will need to be cut, which most likely will involve mitigation. The photo below depicts the location of the proposed tower based on the latitude and longitude provided in the permit request drawings. See photo on page 7.

Please don't hesitate to reach out to us with any questions or comments at 305 666 5775 or e-mail to gzadikoff@gmselby.com.

Respectfully,



Gerald Zadikoff, PE, F-ASCE, D.CE, D.FE

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*Note water located on two side of the site